Rock Products

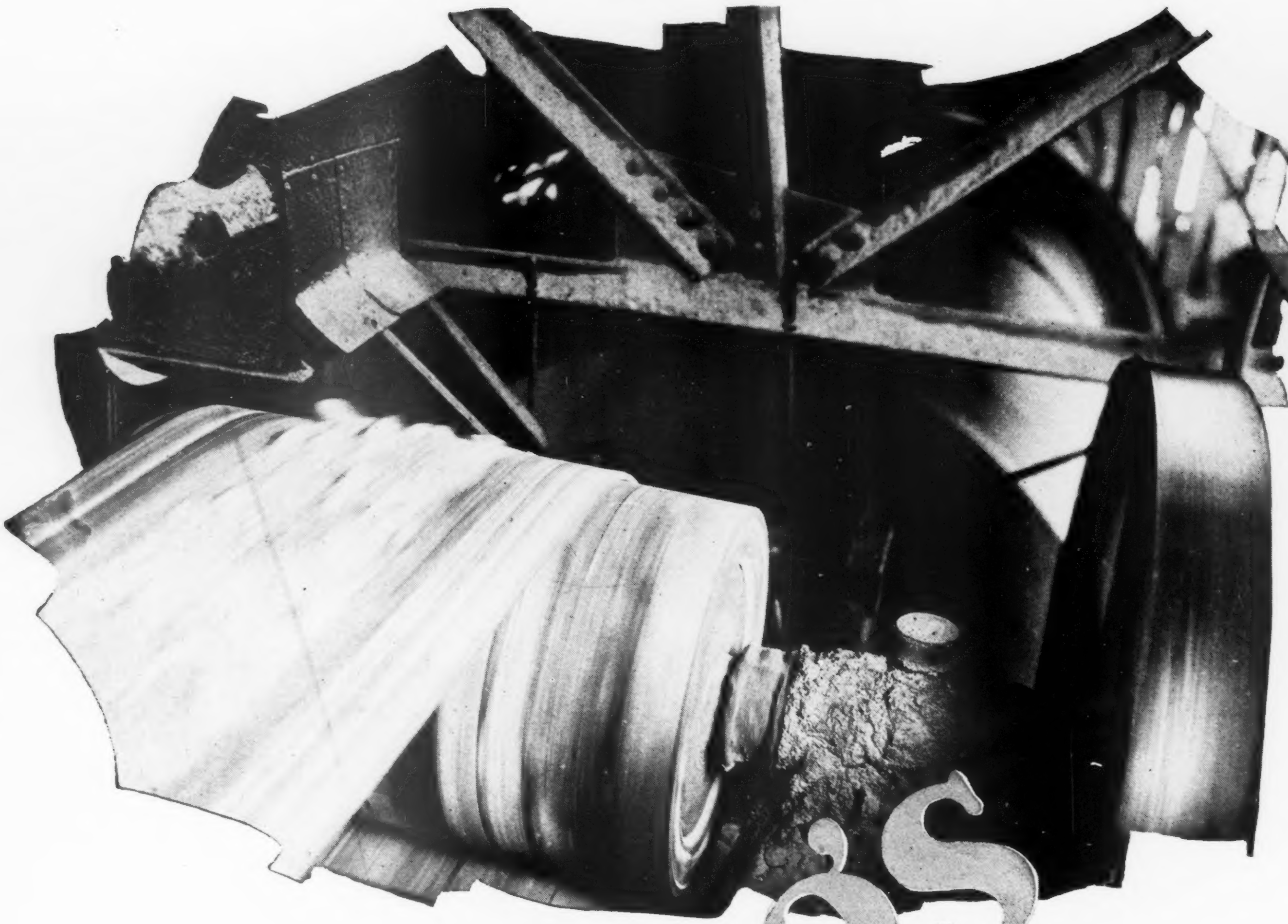
With which is Incorporated CEMENT and ENGINEERING NEWS

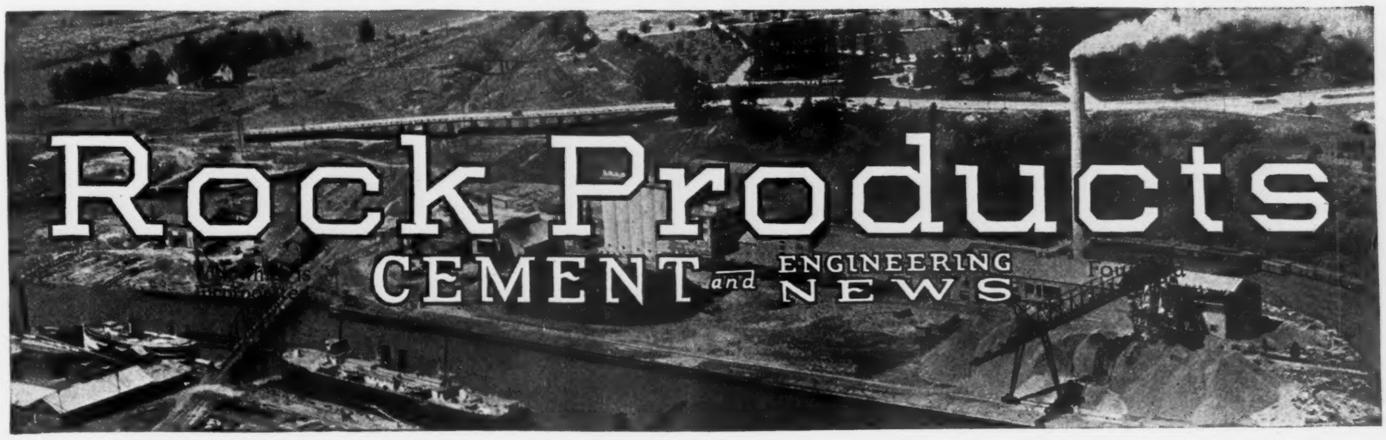
Founded 1896

Chicago, September 5, 1925 (*Issued Every Other Week*) Volume XXVIII, No. 18

MEMBER A.B.C. — *The Only Paid Circulation in this Industry* — MEMBER A.B.P.

Printing of This Issue Is 5350 Copies. Next Issue Will Be September 19





Volume XXVIII | Chicago, September 5, 1925 | Number 18

Washing Limestone for Chemical Industries

Columbia Quarry Co. Washes the Fines From Flux at Its Valmeyer, Ill., Plant To Make a Very Pure Product

E. J. KRAUSE, president of the Columbia Quarry Co., St. Louis, believes that eventually all crushed stone used as concrete aggregate, and for some other purposes where cleanliness and purity are essential, will be washed. He believes furthermore that purchasers are willing to pay for washed material and he has tested this out by making shipments of washed and unwashed stone to some of the dealers which the company supplies. His experience has been such that he has been introducing

Power house, washing plant and crushing plant of the Valmeyer quarry of the Columbia Quarries Co.

washing methods into the quarries which the company operates, even those in which the stone would ordinarily be considered clean.

It is, of course, not necessary to wash the entire product of a quarry in every case. In the Valmeyer, Ill., operation of the Columbia Quarry Co. the greater part of the product is stone above 2-in. size which is sold for flux. That which is below 2-in. size goes to the washing plant and is washed so clean that it is sold as chemical limestone.

The Valmeyer operation is interesting from the nature of the deposit that is being worked. It is 37 miles from St. Louis and about half that distance from the town of Columbia, Ill. The road from Columbia to Valmeyer follows a limestone bluff, 100 to 200 ft. high almost all the way. This bluff is of the Mississippian limestones. At the Valmeyer quarry the bluff is broken into by the upper part of a great anticlinal fold. This is the Kimmswick lime, and, according to the Illinois Geological Survey it belongs to the Ordovician system which is very much older than the Mississippian limestones found on either side. It is a very pure high-calcium stone running almost 99% $CaCO_3$. So pure it is that the company sells it for flux with a guarantee that the silica content will not exceed $\frac{1}{3}$%.

The main axis of this fold extends almost east and west and crosses the Mississippi river. The rock is distinctly different from the Mississippian limestones on either side. It is a rather coarsely crystalline stone of a pinkish color. In the upper part of the ledge wherever there are breaks or vug holes, these are lined with crystals of pure calcite. The ledge extends downward for 35 ft. and rests on a silicious limestone ledge about 13 ft. deep which is also folded.

There is considerable overburden on that part of the quarry which was worked at first and this was removed with a Sauerman dragline with a scraper bucket. As the work proceeded the amount of overburden to be removed increased so a change was made to another part of the deposit where it was less. This required the building of several hundred feet of track, a part of which has been put in on a 12% grade. This is unusual, but the locomotive, an 8-ton Plymouth, seems to negotiate it well enough with the empty cars, and is able to hold them on the return trip, down grade.

The washing plant showing the receiving hopper and scrubber in front. The screen is set at a right angle to the scrubber

This grade will be put out of commission and the haul shortened by a 700-ft. tunnel which the company is beginning to drive. The fall through this tunnel will be enough for the loads going down to the plant to pull the empties up, and the locomotive will be needed only for gathering cars. This tunnel will be the start for the mining operations which are to be begun as soon as possible.

Well-drill holes are put down with a Sanderson-Cyclone drill and loaded with 40% Grasselli powder. The rock breaks well. It is loaded into 6-yd. cars by by a Marion No. 32 steam shovel on caterpillar treads.

While it is planned to mine the stone in the near future, quarrying will not be abandoned. Work will be continued on the newly opened face described above.

The plant is very simple, as only two products are made. The ore is dumped from the cars on a platform built around the mouth of a No. 12 Gates, Allis-Chalmers crusher. A No. 6 Allis-Chalmers jaw crusher may be used for recrushing when more of the fine size is wanted, but this is in use only a part of the time. The broken stone is passed through a rotary screen with 2-in. perforations. The oversize goes to cars to be shipped for flux and the undersize goes to a belt conveyor that takes it to the washing plant.

The washing plant has been placed above

Left—The quarry after a shot had been fired. Right—Part of quarry face. Note depth of earth to be stripped which shows under the lone tree at the right

About one-half of the fold of "Kimmswicke" limestone which supplies stone for this operation. It is much older than the Mississippian limestones on either side

the railroad track with sufficient clearance for cars to pass beneath it. It contains a hopper into which the belt conveyor discharges, below which is a scrubber which takes the material from the hopper and discharges it into a Gilbert (Stephens-Adamson) screen with 3/16-in. openings. The oversize of the screen is sent to cars to be shipped as chemical limestone, the under-size is sent to waste. This undersize contains all the dirt and clay that come with the stone and a little fine limestone which it is not attempted to recover at present. Later a method of recovering this will be introduced.

A cleaning screen is placed in the chute by which the material is run to cars in order that any dirty water and fine dirt that is present may be kept out of the cars that are loaded. But this is rather a precautionary measure than a necessity, as whatever fine material runs through this screen is usually so clean that it is shovelled into the car.

The scrubber is of a type designed by the company's engineer which has some unusual features. It does very good work on breaking up clay balls and does not take much water. The discharge from the scrubber is almost pasty it is so thick. This is thoroughly washed and rinsed in the Gilbert screen, which is itself a good washer, and the pieces that leave the screen are bright and clean.

The plant produces 900 tons per day. P. G. Forman is superintendent. He is a graduate of the Missouri School of Mines at Rolla, Mo. The main office of the company is in St. Louis, Mo.

Depletion: What It Means

A BULLETIN "A" has been issued by the National Sand and Gravel Association to assist its members in preparing their income tax reports. T. R. Barrons, executive secretary of the association has written the editor that he will be glad to furnish any readers of Rock Products with a copy of this publication on request.

The bulletin is a simple description of depletion as related to the rock products industry, that is allowable under the federal income tax laws. It explains the difference between depreciation and depletion and shows how many producers in their confusion of the two terms do not get the proper deduction allowed by the Bureau of Internal Revenue. Another point discussed is the derivation of true profit by taking into consideration the amount of non-mineral lands which appear on the books and are as taxable as the profit yielding mineral lands, but which yield no material value—in fact are a debit unless consideration be made for them.

In calculating yearly depletion, the cost of the property owned prior to 1913 is based on the market value of 1913, if purchased after 1913 the actual cost price is used. The books of the company should show:

1. Date property or deposit acquired.
2. From whom purchased.
3. Consideration, cash, stock, etc.
4. Total number of acres.
5. Estimated recoverable units at date of purchase and number of acres containing deposits.
6. Acres containing no commercial sand or gravel.
7. Value per acre of land not containing sand or gravel.
8. Value of quarried acres after operations.
9. Production from property each year.

Depletion then should be based on a deduction for each ton of material produced so that in the estimated life of the deposit, the original investment may be returned. In the case of leaseholds, depletion is chargeable only where cost consideration is made, either with addition of royalty or without.

Not only is depletion a question of deduction from the income tax but it is an actual cost on the production of sand and gravel, hence for the correct accounting and estimation of true profits, it must be considered.

Left—Opening a new quarry face where there is less strip ping to remove. Right—The 12% grade to new quarry face which will not be used after the new tunnel is driven

Lime in the Manufacture of Rubber

Accelerator and Hardener

Harry L. Fisher
The B. F. Goodrich Co., Akron, Ohio

RUBBER is made useful and available in the arts through the process of vulcanization. Vulcanization consists in heating a mixture of rubber and sulphur and other necessary and advantageous ingredients for a certain time at a definite temperature. The time and temperature vary with the relative amount of sulphur and with the character and amount of the other ingredients. The different properties of vulcanized rubber as commonly seen in such familiar articles as rubber bands, automobile tires, sponge rubber, hot water bottles, fountain pens, radio panels, and battery jars, show how variations can be made for definite purposes.

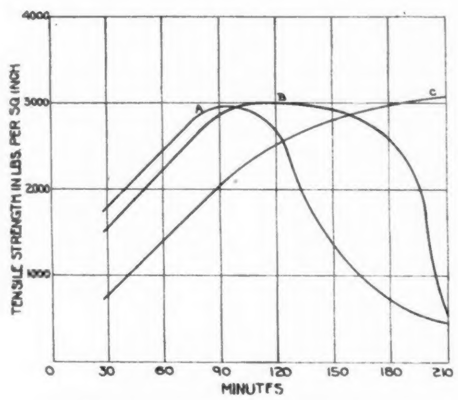
Although Charles Goodyear discovered vulcanization 86 years ago, and although much excellent work has been done upon it since his time, the process is not yet fully understood. In commercial practice, however, great improvement in the process has been made.

The temperatures used for vulcanization generally run from 240 deg. Fahrenheit to 300 deg. Fahrenheit, and sometimes as high as 335 deg. Fahrenheit.

Time is even more important than temperature, not only from the standpoint of accomplishing vulcanization or curing, as the rubber man calls it, but also from the standpoint of factory turnover. Most rubber goods are cured in molds or on forms; these are expensive and represent considerable capital. Accordingly, the more rapid the turnover, the greater the possible output and the greater the profits. The time of curing which used to be two or more hours was shortened somewhat by using higher temperatures or increasing the amount of sulphur but such expedients often resulted in giving poorer products. The most important method of shortening the time is to use in the mixture substances known as "accelerators," which reduce the time of vulcanization from hours to minutes. The chief inorganic, that is, mineral, accelerators are lime, litharge and magnesia; and of these lime is the cheapest.

Besides decreasing the time of vulcanization accelerators often lower the temperatures required, and may give very desirable qualities to the product, such as increased strength, greater resilience, better resistance to wear, slower deterioration in the air, etc. The action of accelerators often depends on other ingredients that are present and this action may or may not be desirable. Ordinarily inorganic accelerators are used only in comparatively small amounts, 1% to 3%, and great care must be exercised in their use, otherwise much harm can be done to the product, and considerable losses suffered.

The type of lime used in the manufacture of rubber goods is that known as "chemical" lime. This, of course, is a slaked lime. Quicklime is not used because it is difficult to handle, varies in the amount of water absorbed and tends to "ball up" during the mixing process.



Effect of lime on rubber mixtures

The lime must be ground fine and be free from grit. The finer it is the more active it is, and the better it can be dispersed (thoroughly distributed) in rubber. For use in white and light colored goods it must also be free from coloring matters, and especially from iron compounds, since the iron reacts chemically with sulphur during vulcanization to form a black sulphide. Other undesirable impurities are the carbonates of lime and magnesium. These substances are all right as fillers but they are otherwise inactive and diminish the activity of the lime. The dolomite limes, that is, those containing a high proportion of magnesia —so-called high magnesia limes—are generally used in soft rubber goods. High calcium limes are used in hard rubber goods.

Lime is used extensively in the great volume of inexpensive goods represented by rubber heels, washers, battery jars, etc. It has a tendency to "harden" the rubber and therefore is incorporated in the batches for many kinds of hard rubber articles. Usually about 1% of lime is used in soft rubber goods while hard rubber stocks may require as high as 10%. On account of its tendency of "hardening" the rubber it cannot be used in all soft rubber compounds. Furthermore, on account of its activity it can not be used as a "filler," like whiting or barytes. Heat softens the rubber mixture in the mold and, under the pressure used to form it to the required shape, allows it to flow more readily. In some cases it is best to stop the flow as soon as practicable and for this purpose lime has proved an excellent material. It causes a rather quick "set up" (stiffening) of the rubber mix during the heating and for this reason is often added to stocks when t hsirapid "setup" is desired. Everyone is familiar with the way certain rubber goods become hard and crack with age. Some rubber articles, including those containing lime, show this type of deterioration more than others. This difficulty of poor "aging" can be overcome in part, however, by the use of special age-resisting substances.

In order to show the influence of lime on a rubber batch the following simple recipe was chosen from a recent publication:

Rubber	75
Zinc oxide	18
Sulphur	6
Lime	1
	100

It was made up in three ways, using a high magnesia lime, A, a high calcium lime, B, and without any lime, C. These batches were vulcanized in thin sheets in a press at 292 deg. F. (145 deg. C.) for various periods of time and then tested in the usual manner for the tensile strength.

A glance at the curves given in the figure will show how much more rapidly the batches containing the lime (A and B) "setup," as indicated by the tensile strength. This is twice as great in each case as the one without lime. The maximum tensile strength with the lime is

reached in about 90 minutes, whereas without the lime the maximum is just being reached at about three hours and a half.

It is difficult to tell how much lime is used in the rubber industry in the course of a year, but some idea of the amount may be gained from the following figures: During the year 1924 there were produced 421,424 tons of crude rubber, of which 391,814 tons were from the plantations in the Far East and 29,600 tons from Brazil and other countries. The United States imported 319,573 tons (75.8% of the total). Since the average batch contains approximately 40% of rubber the total weight of rubber batches was 798,933 tons. Assuming that 2% of lime was used in the average batch and that one-fourth of the total weight of the batches contained lime, there were used in the rubber industry about 4,000 short tons or 8,000,000 lbs. of chemical lime in 1924.

Lime Treatment of Water for the Manufacture of Raw Water Ice

Clarifier and Purifier

A. S. Behrman, Chief Chemist
International Filter Co., Chicago, Ill.

MANUFACTURED ice of any kind is quite a recent contribution to our modern civilization. The first plant of importance in the United States was built in New Orleans in 1866. Prior to this natural ice was harvested in the North, stored as efficiently as possible, and subsequently transported to the point of consumption. In the first two decades of the nineteenth century one Frederick Tudor, of Boston, built up an extensive business in the shipment of natural ice to Savannah, New Orleans, Charlotte and other Southern communities, as well as in exports to Cuba and the West Indies.

With the advent and development of ammonia refrigeration came manufactured or artificial ice. When liquid ammonia expands into a gas it takes up a large amount of heat from its surroundings. This cooling effect may be utilized to chill a strong brine to a temperature considerably below the freezing point of water. If a can of water is placed in this chilled brine, the water will eventually be frozen solid.

It was quickly discovered, however, that if a can of ordinary water was frozen in this way the ice that resulted was of very poor quality. It was opaque, white or discolored, full of air bubbles, and usually could be depended upon to leave a slimy or gritty sediment when the ice melted.

In other words, the quality of the ice depended on the quality of the water. To make perfect ice by this simple method of allowing a can of water to freeze in cold brine required perfectly pure water—that is, it must contain no dissolved substances, either mineral or gaseous.

The problem was solved—for the time being, at least—by the process of distilling the water to remove the mineral impurities, and by reboiling the distilled water to remove the dissolved air and other gases. The "distilled water ice," when properly made by this method was —and still is—of excellent quality—clear and transparent, inviting to the eye and to the taste.

Today, however, probably 90% at least of all the ice is not "distilled water ice" but "raw water ice." The change has been brought about by the availability of cheap, dependable power and by applied chemistry in the form of water softening with lime.

As pointed out in a previous paragraph, if a can of ordinary raw water is allowed to freeze quietly the ice will usually be solid white—"tombstone ice," in the language of the ice trade. In the "raw water ice" process, as now practiced, the water being frozen is kept constantly in motion by bubbling air through it. In this way currents are set up that wash the surface of the ice as it freezes, carrying off the particles of minerals and gases that are frozen out of the water, and which, if not thus removed, would give the characteristic "tombstone" appearance.

The impurities washed off the surface of the ice as it freezes—from the edge of the can inwardly, of course—are concentrated in the unfrozen portion of the water. This "core-water" with its accumulation of dissolved and suspended impurities, may or may not be removed and replaced with fresh water. It is the frozen core-water in the middle of the block of ice that is falsely ascribed to "ammonia" by the housewife.

A few natural waters are so pure that no chemical treatment is necessary for making them suitable for the manufacture of raw water ice; but most waters from which raw water ice can be made must be treated with lime in order to make ice of first quality, and with a minimum of expense.

Without going too deeply into the chemistry involved, it may be stated that the most common objectionable impurities in water to be used in making raw water ice are the same ones that clog hot water lines, form sediment in tea kettles and cause soft scale and sludge in steam boilers. This class of impurities is usually designated by water chemists as "temporary hardness," and sometimes as "dissolved limestone."

This "dissolved limestone," as we shall refer to this class of impurities, causes all sorts of trouble in raw water ice when present in the water in material quantity. It makes cloudy and dull what should be clear and transparent ice. It forms a heavy deposit in the core and bottom of the cake of ice that leaves an objectionable sediment in ice-boxes when the ice melts. It makes the ice so brittle that it must be frozen at comparatively high temperatures—that is, slowly, which means that the plant capacity is lowered.

Another very unwelcome impurity in water for ice-making is iron, though it occurs in objectionable quantity much less frequently than "dissolved limestone." Even a tiny amount of iron will cause what the ice man calls "red ice"—that is, ice with a red or red-brown deposit of a compound of iron.

Treatment of water with lime removes the "dissolved limestone" and iron bodily, by changing them to an insoluble sediment which is removed from the water by settling and filtration. The lime which is used in the treatment is also changed to an insoluble sediment which is likewise removed from the water; so that if a raw water contains even a very large quantity of dissolved limestone (or iron),

proper treatment with lime will leave the water very nearly as pure as distilled water as far as the dissolved mineral substances is concerned.

As a result of proper lime treatment of such water, the ice frozen from it will be beautifully clear and transparent. There will be no deposit or discoloration in the block, no heavy white core, no objectionable sediment when the ice melts. Instead of being brittle, the ice will freeze with so little strain that lower brine temperatures may be safely used, which means that the ice will freeze faster, thus increasing the capacity and turnover of the plant.

Of course, the lime treatment must be given accurately and uniformly, or inferior ice of varying quality will be produced. The treatment is almost universally carried out in a continuous process lime-soda water softener; and the most efficient softener is the one which treats the water most uniformly, since every can of water to be frozen must be as good as the next one.

The quality of the lime used for water treatment for raw water ice is vitally important. The hydrate is universally employed. It should be a high calcium lime, containing not less than 90% to 95% total calcium hydroxide, and with its available calcium hydroxide as close to these figures as possible. There should be a minimum of carbonate either from unburned particles or from airslaking. Magnesia is very objectionable, as it is not only valueless for softening, but actually interferes with the softening reactions. Magnesia should not be present to an extent of more than 2% or 3%. Many excellent finishing limes, made from dolomitic limestone, are absolutely worthless for water softening.

The fineness of the hydrated lime is also important. Practically all of the lime should pass a 100-mesh sieve, and nearly that amount through 200-mesh.

It is worth noting here that there are a number of hydrated limes on the market that meet these requirements.

The quantity of hydrated lime employed in water treatment varies, of course, with the composition of the water treated. The range is generally from about 1 lb. of lime per 1000 gals, of water—as with Lake Michigan water—to 3 or 4 lbs. per 1000 gals. for very hard water. Since 1000 gals. of water is equivalent to a little over 4 tons, it will be seen that the lime treatment is a negligible item of expense in making ice, while still furnishing a not inconsiderable market for a high calcium hydrate.

Finally, it should be mentioned that there are some waters from which raw water ice of good quality cannot be made. These waters contain large amounts of certain kinds of dissolved impurities that cannot be removed by lime treatment. A typical water of this class is one that contains a large quantity of common salt.

For such waters, distillation is the only remedy; and "distilled water ice" will continue to be made in those regions where such waters constitute the only available supply.

Even these waters, however, are not without interest to the lime producer, since in many cases the water, in addition to being salty, is quite hard. In such cases there is frequently a potential market for hydrated lime, to be used in the lime-soda process of softening the water to be evaporated, in order to prevent scaling of evaporators and steam boilers.

Lime Treated Water and Its Effect on Typhoid Bacteria*

By R. D. Scott and G. M. McLure

Ohio Department of Health, Ohio State University, Columbus, Ohio

IT has been observed at many experimental stations over a long period of time that lime treated waters showed marked lowering of bacterial content. The first removal of bacteria in this manner was attributed to coagulation and sedimentation, but later experiments proved that destruction of these groups of bacteria was the actual case. It was also determined that the addition of just enough lime to change bicarbonates formed to normal carbonates was all the material required. The time of destruction for ordinary sewage bacteria ranged from 5 to 25 hours after treatment with the lime. The explanation of the lime sterilization was the lowering of the hydrogen-ion concentration of such lime treated waters and experiments made later seem to bear this out.

For the purpose of the experiments water from six Ohio water purification plants was used. Three of these plants used lime to the extent of lime softening, two used somewhat less and one used no lime whatsoever. Samples of the settled water were collected representing water after coagulation and softening (if used) but prior to filtration or chlorination. These samples were at once sent to the laboratory and analyzed within 44 hours after sampling. The results of examination of 47 samples of water showed that in the case of proper liming the bacteria were completely destroyed whereas in the untreated water it remained active and harmful. By these tests it was concluded that typhoid bacteria do not survive long in lime-treated waters and plants using this treatment possess a distinct advantage over plants which use only the filtration and chlorination method. This is so because destruction of bacteria is doubly insured by pre-treatment of the water by lime. Experiment showed that addition of lime to yield a caustic alkalinity of from 10 to 20 parts per million was ordinarily sufficient to properly sterilize the water. In cold weather it might be necessary to add somewhat more lime.

*Abstracted from the Journal of the American Water Works Association, Vol II, No. 3, May, 1924.

Economics of Liming Studied

THE ECONOMICS OF SOIL LIMING, by John A. Slipher, assistant professor of soils, College of Agriculture, Ohio State University.

THIS paper was read as part of the symposium on "Economic Relationships of Agronomy" at the meeting of the American Society of Agronomy "held in Washington, D. C. It treats with farming as a business and applies the principles of greatest financial returns from the successful liming of soils. The full costs which are ordinarily neglected, such as cost of lime spreading and harvesting increased crop are considered in detail. The full gains such as economy of operation, capital or land profits and crop profits are outlined for different soils studies.

The effects of liming different soils in various localities are listed. In general the greatest returns are obtained from the Eastern states or geologically considered the coastal or oldest soils yield the highest and the loessial or new soils the least; net earnings ranging from 260% in the former to 65% in the latter. Land profit on the whole, based on returns from 17 states, shows a return of $40 per acre and the crop increase, reckoned as 10% of this, as $4 per acre. As an investment liming has returned 138% on all outlay.

Root crops show an average return of $13.75; legumes, $5.50 per acre, forage (timothy, rye, etc.), $3 for every $1 spent in liming, and cereals $2 above cost of liming.

Additional increments of lime show decreasing profits even in lime poor soils. A 15-year test made in New Jersey showed a five-year rotation of crops on a three-acre plot treated with ½ ton raw carbonate per acre yielded the same increase as did two acres treated with two tons carbonate per acre. Results in other states bear this out and in general follow the law of decreasing returns. Furthermore, labor and finance are adverse to heavy rates of application of lime. Scientific results show mild liming best by (1) benefit of lime is primarily to furnish available lime for food purposes and (2) small charges of lime are less subject to loss through natural soil processes.

The Use of Lime for Treating Public Water Supplies to Prevent Corrosion and "Red Water"

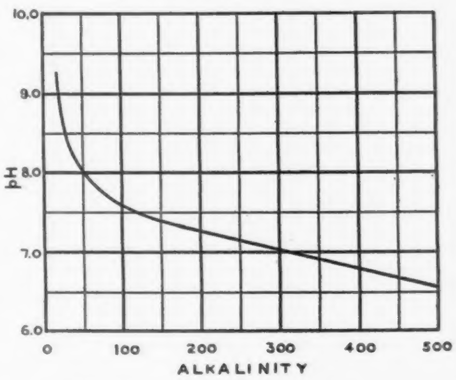
John R. Baylis, Principal Sanitary Chemist
Baltimore City Water Department

THE use of lime in treating public water supplies may be primarily for one of the three purposes: (1) Softening, (2) to aid in precipitating the coagulent, or (3) to prevent corrosion and "red water." This article relates to its use only in preventing corrosion and "red water."

In most instances when lime is used for softening or to aid in precipitating the coagulant, the water is left in a much less corrosive condition than before the treatment and it may be all the lime that is necessary. Especially does this apply to its use for softening, and when used with sulphate of iron to clarify water. Hard water is softened with lime by converting the soluble bicarbonates to a much less soluble calcium carbonate, thereby producing a supersaturation and precipitation. Waters so treated are never corrosive unless an acid compound is later added. When sulphate of iron is the coagulant used for clarification, lime is always used, and the optimum condition for the most efficient precipitation of the iron hydroxide is approximately optimum condition for the prevention of corrosion. Lime does not actually stop corrosion of iron when a bright surface is exposed, but it gradually builds up a protective coating of calcium carbonate. When aluminum sulphate is used for clarification the most efficient results are usually obtained when the water is slightly acid. Until recently practically all chemical treatment of public water supplies has been for clarifying and removing the bacteria, consequently most waters treated with aluminum sulphate have been delivered to the iron pipes quite corrosive.

The corrosion of iron is apparently electrochemical—or to express in terms more readily understood, iron is slightly soluble in water. The rate at which it goes into solution depends somewhat upon the acid or alkali content of the water, but for practically all natural waters used for public supplies the concentration of acid or alkaline salts does not materially affect the rate at which iron will go into solution, if the metal surface is exposed directly to the water. The life of iron pipes depends almost entirely upon a protective coating, whether it be one artificially applied by the manufacturer or one built up from compounds occurring in the water. This, of course, applies to corrosion from the inside, for pipes well protected on the inside may fail by being corroded from the outside if in certain soils.

Treatment of water with lime appears to be the cheapest and most effective means of protecting iron pipes from the inside. This, however, does not obviate the necessity of the pipes being treated when manufactured, for protective coatings are built up very slowly. Untreated pipes frequently start pitting before a protective coating has formed, and when once started, pits are very difficult to stop, even in a fairly alkaline solution. The alkaline sodium compounds are so soluble that their chief aid in preventing corrosion is in producing conditions more suitable for the precipitating or depositing of other less soluble compounds occurring in the water, whereas with lime it may be deposited as a carbonate and form the actual protecting agent.



Calcium carbonate equilibrium curve

It is essential to know the calcium carbonate solubility of water to properly treat it with lime. Some have regarded the point where there is no free carbonic acid present as the proper treatment for any water. This is probably due to a mistaken idea that carbonic acid is the active corroding agent in the water. It so happens that this is near calcium carbonate equilibrium for many of our natural waters, and when water is treated with lime until there is no free carbonic acid it will not be corrosive unless the alkalinity is below 50 parts per million. The amount of calcium carbonate that will be held in solution depends upon the alkalinity, hydrogen-ion (pH) concentration, and to a slight extent upon the amount of certain neutral salts present. No certain alkalinity or hydrogen-ion concentration can be set as that desired for all waters. The calcium carbonate equilibrium curve in Fig. 1 shows that it is only by a knowledge of both that the saturation point of calcium carbonate may be estimated. The saturation or equilibrium point is where the water will neither dissolve nor deposit calcium carbonate. This curve furnishes the key to the proper treatment of water with lime. In many instances it may be desirable to add lime until points are established slightly above the curve, which gives a slight supersaturation, in order to form a coating of calcium carbonate on the pipes; but when the water is hard fairly good protection is obtained when points are somewhat below the curve. Waters containing a large amount of certain neutral salts such as the chlorides and sulphates will give curves slightly different from the one shown. In such cases it is desirable to establish a curve for the particular water, which may be done by adding a large excess of calcium carbonate to the water and sealing in noncorrosive glass containers for about one week. It is impossible to apply lime intelligently to water without a knowledge of the hydrogen-ion (pH) concentration, yet it is a factor that many try to ignore.

Best protection of the pipes is obtained when the pH is kept slightly above the equilibrium curve, for calcium carbonate will then be gradually deposited and eventually offer complete protection. This may give trouble in a few instances when the water is used for certain commercial purposes, such as for ice making. It may also add slightly to boiler troubles. These troubles are of a minor nature and the water may be easily corrected by the industries. The added cost to the man-

ufacturers is negligible in comparison to the value of protecting the pipes. If it is desired only to prevent iron stains on the white plumbing fixtures the amount of lime necessary may be slightly less than that necessary to form protective films. This is best illustrated by assuming water with an alkalinity of 50. The curve shows that calcium carbonate equilibrium for this alkalinity is at a pH of approximately 8.0. If it is desired to build up a protective coating the pH after adding the lime should be about 8.4, but if it is desired only to prevent stains a pH of about 7.6 will be sufficient. The lower pH will lessen the corrosion but will not prevent it entirely. The proper treatment for such a water after a protective coating has formed is a pH of about 8.1.

Some have offered the objection that the increased cost of treatment and the added amount of soap used does not justify such a treatment. In practically all instances the cost is more than counterbalanced by the increased life of the pipes; however, if it added nothing to the life of the pipes and only prevented stains and "red water" the treatment would be well worth while. Satisfaction has a value, and this applies to the water we use as well as to the clothes we wear or the food we eat. In Baltimore, where the consumers have been accustomed to a non-corrosive water, the use of lime was stopped for a short while. Complaints of "red water" became so numerous we probably would have been forced to go back to the treatment in order to satisfy the consumers had there been no other consideration. The writer has not received a "red water" complaint within the past three or four years. An average of 50 lbs. of lime (CaO) per million gallons of water is now required for our water. This increases the soap hardness about 10 parts per million, which is a very small amount in comparison to the value of eliminating corrosion troubles. There seems to be a mistaken idea that a filtration plant is necessary when lime is applied to water. If it is for the prevention of corrosion all that is necessary is a reservoir that will provide several hours' storage so that the insoluble lime may settle.

Calcium Carbonate Equilibrium

The saturation point of calcium carbonate depends upon the hydrogen-ion concentration (pH), alkalinity and the concentration of certain neutral salts. The curve is based upon the saturation of calcium carbonate in distilled water. The amount of neutral salts found in most public water supplies does not materially affect it, and while it is better to check each individual water, the curve will be found to be approximately correct for most waters. When points are above the curve the tendency will be to precipitate calcium carbonate, and when below calcium carbonate will be dissolved. There is a zone just above the curve where calcium carbonate will be precipitated on surfaces in contact with the water, but a precipitate will not be formed throughout the solution. This is the zone in which water should be adjusted with lime to completely prevent corrosion of iron pipes.

Lime Production in 1924 a Little Less Than 1923

SALES of lime by manufacturers in the United States in 1924 amounted to 4,072,000 short tons valued at $39,596,423 f.o.b. kilns, according to a compilation of reports of producers made by the U. S. Bureau of Mines, Department of Commerce. These figures show a reduction in quantity of less than 1% and in value of about 1% from the 1923 figures of 4,076,243 tons and $39,993,652. The average value per ton at the kilns in 1924 was $9.72 compared with $9.81 in 1923.

Lime sold for building and construction amounted to 2,169,700 tons, valued at $23,011,935, an increase of about 2% in both quantity and value. Lime sold for chemical uses amounted to 1,653,964 tons valued at $14,719,974, a decrease of 3% in quantity and 6% in value. Lime sold for agricultural purposes amounted to 248,336 tons valued at $1,864,514, an increase of 3% in quantity and 2% in value.

The sales of hydrated lime in 1924, included in the above total, were 1,316,664 tons valued at $13,199,846, an increase of 7% in quantity and 8% in value. About 78% of the hydrated lime sold—1,029,384 tons valued at $10,420,151—was for construction work. This was an increase of 12% in quantity over 1923. Hydrated lime for chemical uses (158,870 tons valued at $1,618,873) and for agricultural purposes (128,410 tons valued at $1,160,822) both showed decreased sales as compared with 1923.

Although lime is manufactured in 40 of the states and in the territories of Hawaii and Porto Rico, over 98% of the production comes from 22 states. The sales of lime by uses in the principal producing states in 1924 is shown in the accompanying table.

Discover Large Deposit of Marl in Maine

FROM the *Lewiston (Me.) Journal* comes the report that an enormous deposit of lime marl has been found near Fort Fairfield, Maine. The discovery was made by Olaf O. Nylander, a biologist, who found the peculiar plant with which all such deposits are associated. This plant has up to now only be found in the United States in only one state—Michigan. Should the report be true, this find will be of great value to Maine, for great quantities of lime are used in the potato growing industry.

Production and Importation of Asbestos in 1924

THE production of asbestos in 1924, as reported by producers to the U. S. Bureau of Mines, Department of Commerce, amounted to 300 short tons, valued at $42,526. These figures comprise 173 short tons of chrysotile asbestos, valued at $33,941, mined in Arizona, California and Montana, and 127 short tons of amphibole asbestos, valued at $8,585, mined in Georgia and Maryland.

The imports of unmanufactured asbestos amounted to 183,250 short tons, valued at $3,602,945.

LIME SOLD BY PRODUCERS IN THE UNITED STATES IN 1924, BY USES

	Building		Agriculture		Chemical		Total	
	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value
Ohio	671,510	$ 6,891,769	19,686	$ 134,943	243,211	$ 2,484,558	934,407	$ 9,511,270
Pennsylvania	288,899	2,500,901	116,966	883,225	294,515	2,250,680	700,380	5,634,806
Missouri	82,051	797,665	*	*	†161,414	†1,556,510	243,465	2,354,175
West Virginia	29,365	259,785	18,289	122,594	191,060	1,502,303	238,714	1,884,682
Wisconsin	227,978	2,028,839	*	*	†7,052	†100,862	235,030	2,129,701
Alabama	54,422	517,802	....	....	149,637	1,294,480	204,059	1,812,282
Massachusetts	151,974	2,333,577	4,928	17,995	37,500	341,456	194,402	2,693,028
Virginia	86,161	759,188	19,906	130,571	66,709	519,688	172,776	1,409,447
Tennessee	73,496	707,774	791	5,407	70,005	398,600	144,292	1,111,781
Maine	77,258	1,374,100	8,166	40,424	40,264	395,405	125,688	1,809,929
Indiana	21,656	188,222	5,157	35,622	90,114	767,159	116,927	991,003
New York	24,490	228,478	3,988	30,215	70,114	733,106	98,592	991,799
Illinois	44,587	524,516	....	....	44,545	409,683	89,132	934,199
Michigan	12,416	113,067	*	*	†60,680	†589,005	73,096	702,072
Texas	44,017	420,518	*	*	†16,548	†149,816	60,565	570,334
California	40,914	447,535	3,251	44,992	15,418	165,611	59,583	658,138
Connecticut	56,345	774,452	‡	‡	‡	‡	58,851	796,541
Vermont	27,923	397,514	829	4,277	27,732	308,948	56,484	710,739
Maryland	9,416	72,568	40,628	355,776	6,134	41,761	56,178	470,105
Washington	20,742	266,174	*	*	†7,446	†87,276	28,188	353,450
Arizona	‡	‡	‡	‡	‡	‡	27,972	331,756
Minnesota	19,412	242,385	....	....	6,352	76,681	25,764	319,066
Undistributed	104,668	1,165,106	4,095	47,824	49,170	557,035	127,455	1,416,120
Total	2,169,700	$23,011,935	248,336	$1,864,514	1,653,964	$14,719,974	4,072,000	$39,596,423

*Included under chemical.
†Includes agricultural.
‡Included under "Undistributed."

Lime in the Treatment of Dye and Textile Wastes

Neutralization of Organic Waste

Foster D. Snell, A.M., Ph.D.
Pratt Institue, Brooklyn, N. Y.

THE chemical purification of trade waste in this country is a relatively new problem. At the present time in certain districts manufacturers are compelled by legislative enactment to purify their waste to such an extent that it shall have but little color, be non-poisonous to fish or vegetable life and not constitute a nuisance to persons or manufacturers located down stream. If this problem were extended to all the textile wastes dumped into streams it would constitute a tremendous one.

The general process used for purification of a dye waste by coagulation is analagous to dyeing of fabrics by mordanting. A metal salt is dissolved in the combined dye solutions and an alkali then added to precipitate the metal hydroxide. The salts used in the United States are copperas and aluminum sulphate. In England and on the continent ferric alum is also used. Lime is almost universally used as an alkali.

The lime is used in such trade waste work solely for its alkaline reaction. It is, therefore, necessary only that it give as high a degree of alkalinity as possible in comparison with its cost. A lime high in magnesium oxide is less valuable than a high calcium lime for neutralization of a weakly acidic solution or making a solution alkaline, as is the case here.

Waste dye liquors may be classified as acid, neutral or basic according to the type of dyeing in the plant. The first and second require lime, the third can seldom be treated satisfactorily by coagulation. The final effluent must be neutral or slightly alkaline, which means that the amount of lime used will depend quite largely on the type of dyeing done, and on the auxiliary processes. Installations on acid waste may use in an extreme case up to 100 lb. of lime per 1000 gals. and on neutral waste a fair average is 5 lb. per 1000 gals. Three to 10 lb. of metal salt are used per 1000 gals.

In connection with a dye plant there are many liquid wastes other than dye baths, such as: Sour liquors, mercerizing baths, peroxide or hypochlorite bleach baths, soap liquors, boil-offs, etc. In general these baths, if small in volume, are mixed with the dye waste so that a composite effluent is treated. When sour liquors are large in volume it is occasionally found necessary to partially or entirely neutralize with lime. More commonly, however, such a plant also has waste mercerizing liquors which are used for that purpose. When a large amount of waste mercerizing liquor is to be disposed of it may be neutralized with sulphuric acid, but is more commonly worked into the bleach process, with or without previous concentration.

The kind of lime used in treatment of dye waste depends on the type of feed

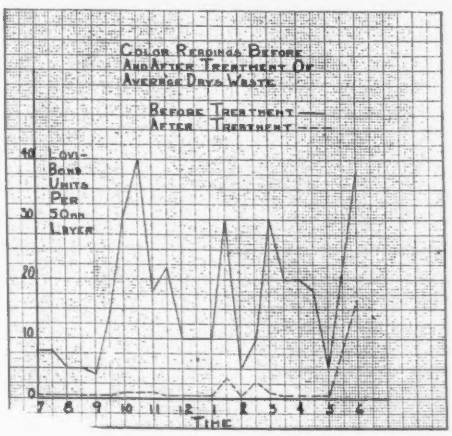
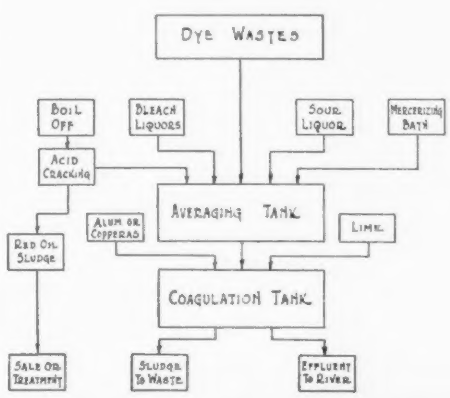


Chart showing results of lime treatment

used in the installation. In some cases a dry feed is used which requires the use of hydrated lime. The power and labor cost here is low but the expense of hydrated lime is high. Other installations feed the lime as a thin slurry. Burnt lime is used for this, resulting in a higher labor cost, about the same power cost and lower material cost. When used for a chemical purpose such as this 75 lb. of



Flow sheet of typical treating plant

burnt lime are equivalent to about 100 lb. of hydrated lime. The final result is about the same in either case. The wet or dry lime is discharged into a calender where it is thoroughly mixed with the textile waste and metal salt solution before reaching the precipitation tank. The rate of flow in this calendar should be at least 0.6 ft. per sec. In the precipitation tank the flock carrying the dye and other objectionable material settles out and allows the clear effluent to overflow. The sludge from precipitation must be thin enough to flow readily, which means that it will have 95-99% of water. This sludge is usually discharged to drying beds or filters. In at least one case, the Passaic Valley Sewer District, this sludge is acceptable for discharge into the sewers. There it is later settled in large tanks on the New Jersey meadows and disposed of along with other refuse from the valley.

In some plants the concentrated soap liquors or boil-offs are cracked with sulphuric acid for recovery of red oil. These fatty acids from the boil-off are salable and after suitable processing are the basis of at least one succesful soap plant. The acid liquors from these operations are usually joined with other liquors for treatment and increase the amount of lime required for neutralization.

Another greasy textile waste is wool-washings from degreasing of raw wool. Common practice in both England and the United States, when this must be purified, is to first settle out sharp sand in detritus chambers. The remaining waste is then cracked with sulphuric acid and a sludge separated by gravity containing 60-80% of the grease and fine dirt present. The acid filtrate from this operation is now discharged into the nearest stream, but in all probability as laws become more stringent it will be necessary to lime to remove the excess acidity and to carry the purification to a greater efficiency than present practice. In one district such action is imminent.

The accompanying flow sheet gives the sequence of the main operations in a typical plant dyeing textiles. In the graph are given data on the color present before and after treatment, which gives an idea of the variation to be expected throughout the day.

Recent developments in this field have

indicated the possibility of using chlorine or activated carbon in a limited number of cases, but there is no probability of these methods displacing the old copperas or aluminum sulfate and lime treatment.

In the treatment of dye and textile wastes lime is occasionally replaced by by-products of other industries. One plant uses the liquor from the lime pits of a tannery for treatment of a combined waste. Another competitor is waste caustic soda from mercerization of cotton or from making alkali cellulose in the viscose industry. Other uses for these caustic solutions make their employment in trade waste treatment uneconomical.

In general because of the advantages of a clean cut simple process lime is without a competitor in this field of treatment of dye and textile wastes.

The Kraus Method of Making Quick Setting Lime Plaster

Observations Made During Visit to Laboratory and an Inspection of Product

By Edmund Shaw
Editor, Rock Products

A NEW lime plaster has been worked out by the Kraus Research Laboratories of New York, which seems to possess all the well known virtues of a "straight" lime plaster in addition to quick setting and hardening. From the chemist's point of view, the compound would probably be classed as a hydraulic lime or cement, since it contains silica and alumina in addition to lime. But the mixture is neither calcined nor fused as cements are; the process of making the plaster requires comparatively low temperatures. In appearance it is a white powder not much different from hydrated lime. It is mixed with water and sand in the ordinary way and applied just as any other plaster would be.

The Kraus Research Laboratories is what its name implies—a private or commercial institution for research. Its staff learns of a product or a process that is wanted and goes after it in a systematic way, sometimes carrying on experiments for years before it develops the process or makes the product desired. Each experiment is analyzed, the favorable factors combined and the unfavorable factors eliminated until at last the product or process is perfected.

Such work has saleable value, and the purchasers of a new product or process are sometimes willing to pay high for it. The General Motors Co., the Babcock and Wilcox Co., the Johns-Manville Co. and the American Cork Co., are among the better known organizations which have secured the rights to Kraus methods and products. The right to make the new lime plaster for a certain district has been bought by one well-known lime company and other companies are negotiating for rights in other parts of the country.

Charles E. Kraus, the head of the institution, wrote Rock Products concerning this plaster a short time ago, and it seemed to be of sufficient importance to be investigated. One of the editors of Rock Products visited the laboratory at 110 West 40th Street, New York, saw the product as it appears on the wall and had the various steps of the process of manufacture explained. Reports of tests in considerable number were examined and the intermediate products of manufacture were investigated. Time forbade the acceptance of Mr. Kraus' invitation to see the method worked through from start to finish, but enough was seen to couple with a moderate knowledge of the chemistry of similar compounds and arrive at the conclusion that the new product is what Mr. Kraus says it is, and that it will do what he says it will do.

It is interesting to know how Mr. Kraus began his work on plasters and cements. Originally he was working in clays, and in this work the idea came to him that if he could change the physical structure of a mineral, he would have a new substance, with the possibility of its forming new compounds. If he could change the crystalline form of a mineral to an amorphous form, or an amorphous mineral to a crystalline form, he would certainly have something different—it might be better or it might be a worse product for any certain purpose, but certainly it would be different. This is easy to understand, and one thinks immediately of such natural examples as crystalline silica, which is quartz and the non-crystalline form which is hyalite or opal.

This was back in 1909. Mr. Kraus did some work at the time but went after the matter very earnestly when the Klingenberg clay of Germany was cut off during the war. This clay has a high proportion of colloidal matter which ordinary clays (contrary to a quite common opinion) do not. It has been exported to all parts of the world to mix with other clays to give them a desired plasticity. Mr. Kraus succeeded in producing a pure colloidal clay (which is quite valueless commercially) and later developed the "K-10" clay which is now being used in this country in place of Klingenberg clay.

Since colloidal clay is the basis of the work on lime and cements which will be described it is worth a word or two of itself. A large jar of it, made from kaolin, was shown the writer. Except that it is pinkish in color, it looks about like library paste. It is sticky and a little of it can be rubbed in the hands until it apparently disappears. Yet clay which has been treated to put the silica and alumina in the colloidal form will set to form a cake like a stone. This colloidal material is called "Krauscake." It has a hardness about that of feldspar and it has a high modulus of rupture when tested for transverse strength.

The first step in making the new plaster is to make "Krauscake." The details cannot all be published, but it may be said that the process consists in treating the clay (almost any clay will do) by first heating it to a certain temperature for a short time and digesting with an acid in the presence of a catalyst. The product is not allowed to set but is mixed with water to form what Mr. Kraus calls "Slurry A." This mixture is fed into a lime hydrator along with burned lime and ground limestone. Both the silica and the alumina in the treated clay are in the colloidal state. Certain reactions go on in the hydrator between the lime and the alumina and silica compounds and new compounds are formed. The mixture comes from the hydrator at about 450 deg. F. This temperature is raised to 600 deg. F. which completes the process.

The writer was shown the flow sheet of a "pilot" plant now being built in Maryland. It is very simple. The clay goes first to a comparatively short rotary kiln and then to acid treatment and to beaters. Water is added to form the slurry which is pumped to a tank from which it is fed to the hydrator. Burned lime is brought in by one conveyor and ground limestone by another. After leaving the hydrator, the mixture passes to another short kiln from which it emerges as the finished product.

The part the ground limestone plays is not well understood. If it is added after the

hydration of the lime, the product is not so satisfactory. There is little or no chemical combination with the ground limestone (which may be either dolomite or high calcium stone) and the other substances, although the burned lime combines completely with them. Possibly it supplies a necessary amount of coarse particles without which setting would be incomplete.

Mr. Kraus said that Dr. Brown of Johns Hopkins, who has examined and tested the new plaster, thinks that its setting is due to the formation of compounds similar to slags, except that they form at temperatures lower than slags. This would seem to be in line with what German investigators have reported on the setting of Portland and other cements.

Mr. Kraus is also working on a hydraulic lime, or perhaps a synthetic "natural" cement would be a better name for it.

He has also worked out a method of making a portland cement from this colloidal clay and limestone. This, he says, burns to a perfect clinker at 2000 F. The ordinary limestone clay mixture put through the same furnace at the same temperature did not combine at all. It is his aim to develop this into a quick-setting cement, and the first tests of the cement after 24 hours setting and hardening were made on the day the writer was at the laboratory. They showed some progress in that direction.

Another interesting thing the writer was shown was a very light and porous aggregate made by burning colloidal clay. It is of about the weight of cork, 15 lb. to the cubic foot. From its structure it has very little strength but it has valuable properties as an insulating material.

The following comparisons of the characteristics of ordinary lime plaster, gypsum plaster, and Kraus plaster were furnished by Mr. Kraus:

MODULUS OF RUPTURE—2:1 SAND
MODULUS OF RUPTURE IN LBS. PER SQ. IN.

Days:	1	3	5	7	10	20
Standard portland cement	370.1	547.9	610.9	784.3	810.0	840.5
LPC-2806 portland cement	435.3	591.7	781.6	....	860.0	975.76

NOTE:—Above data taken from charts No. 5643-World and No. 5644-World.

PLASTICITY; MODULUS OF RUPTURE; SAND CARRYING CAPACITY; WORKABILITY; ACCOUSTICAL PROPERTIES

	Plasticity Figure	*Strength in lbs. per sq. in. — Hours 14	18	24	Days 4	Sand Carrying Capacity	Workability	Accoustical Properties
Gypsum	65	192.8	222.0	259.0	468.1	2:1	Low	Low
Lime	120	0.0	10.0	40.0	70.0	3:1	Excellent	Excellent
Kraus Plaster	350	121.0	140.0	318.0	445.0	3:1	Excellent	Excellent

*Shown in Modulus of Rupture.

Use of Limestone in Illinois

A REPORT of the Illinois Agricultural Association shows that Illinois in the next year will probably use more limestone than in past years. During 1924 Illinois farms required 500,000 tons or approximately one-fourth of the amount produced in the United States. Since this amount is sufficient for only 5% of the arable land in the state and as the use of limestone gains favor among farmers, it is easy to predict an increase for 1925.

Lime in Dirt Roads*

Facilitates Drainage and Dragging and Helps Prevent Rutting

By Dean E. J. McCaustland
University of Missouri, Columbia, Mo.

FROM time immemorial man has recognized that the formation of mud after rains always interposed a serious bar to his physical and material progress. Whether he attempts to proceed on foot or on horseback; by coach or by automobile, "mud" has ever been, and still is, anathema! Except for travel in the arid regions he has escaped the curse only by great effort and expense or by having recourse to some form of floating conveyance on the surface of the waters or in the air above his head. Although he has not succeeded in conquering the earth he has not hesitated to invade both sea and sky.

Now on the surface of the earth in all regions where men live there are many varieties of soil; and if these soils are silts, loams or clays, they will, when wet become sticky and cling to the feet of both man and beast as well as to the wheels of moving vehicles. Furthermore, when soils are wet their bearing power is quickly lost, traffic breaks through the surface and ruts are formed which tend to grow deeper and deeper as traffic continues.

The common agricultural soils containings silts, loams or clays are never entirely suitable for all-weather roads; and yet it is likely that more than 80 per cent of all our country and by-roads for generations to come will of necessity be constructed upon and of such soils.

It is a pressing problem to know what can be done to improve this situation. Underdrains and surface ditches have had thorough trial and have done something to lessen the difficulties of the problem. Transverse sections with all ranges of crown from high to low have been tried and found to be merely palliative; sand has been incorporated with clays and a reasonable degree of success attained; but in the main the actual area of muddy roads in the United States is increasing rather than decreasing from year to year.

Outside the Realm of "Permanent" Highways

It was to be expected therefore that the recent expansion of the road building program in the United States in the field of the so-called "permanent highways" should result in greater interest in some means of improving the roads subject to continuous maintenance. In the fall of 1923 the engineering experiment station of the university of Missouri entered into a co-operative agreement with the National Lime Association to conduct field and laboratory investigations in an attempt to determine the effect of the use of commercial lime on earth roads with the hope of reducing both the inconveniences and the expenditures caused by the formation of mud. The work was placed directly in charge of Horace W. Wood, Jr., as research fellow in the experiment station and the material used in the investigations was donated by some of the constituent companies of the National Lime Association.

Laboratory tests were begun in December, 1923, for the purpose of determining the more obvious physical characteristics of the soils under investigation and to become acquainted with the changes wrought in those characteristics by the addition of predetermined percentages by weight of lime. At a somewhat later time selected stretches of clay roads, subject to heavy traffic, were treated with varying percentages of hydrated lime and these stretches have been kept under observation for a number of months.

The winter season of 1924-25 was an extremely trying one on these test roads because of a heavy fall of sleet and ice early in December and a continuation through the winter of alternating periods of thawing and freezing. In every case, however, these test sections, all of which have been carrying traffic during the past seven to eleven months, show to the most casual observer the distinct advantage of lime admixtures in preventing surface stickiness and the formation of deep ruts under traffic.

In brief, it seems to have been established beyond question that the addition of hydrated lime in the proportion of from 2 to 5% dry weight to clay soils will materially reduce the tendency to form mud and prevent to a great degree the formation of

*Paper read at Seventh Annual Convention, National Lime Association, Briarcliff Manor, New York, May 26, 1925.

ruts; there is reason to believe, however, that such treatment will not in any degree lessen the production of dust and in some cases the dust may be increased.

Notes on Tests

The following facts are abstracted from Mr. Wood's monthly reports. Early in July, 1924, a stretch of 500 ft. of road near Hallsville, Mo., was treated with hydrated lime to a depth of 5 in. On 250 ft. the proportion used was 2% by dry weight and on the remaining 250 ft. 5% by weight was incorporated in the soil. Later a section of road 250 ft. long was treated with 5% of hydrated lime incorporated to a depth of only 2 in. for purposes of comparison. These road sections have been under careful observation since the original treatment and especially after rains; the clay and lime mixture does not stick on the wheels of passing vehicles but smooths out and packs much more quickly than does the untreated clay; there appears to be a more uniform vertical distribution of moisture in the treated soil, and a reduced moisture content at the bottom of the treated section.

Maintenance is therefore more easily accomplished on the treated portion because there is no formation of the hard crust on the top before the road is sufficiently dry to drag, such as is characteristic of the untreated clays. No marked difference appears in the results brought about by the different depths of incorporation and this is of some importance since it so directly affects cost of treatment. The laboratory tests of the heavy clays indicated a slight retardation of surface evaporation on the treated samples but this fact seems to have no practical significance.

Some two months after the Hallsville experiment was begun it was observed that there was no development of ruts in the treated portion of the road following heavy rains while the untreated portion showed ruts from 2 to 4 in. in depth. Furthermore, the maintenance of the treated stretch of road seemed to be much more easily accomplished than that of the untreated part, mostly due to the fact that it could be begun much more promptly after the rains ceased.

Two other important test roads were established; one during September, 1924, in the Missouri river bottom lands near Jefferson City, where the native soil is known as a Wabash clay. This was divided into two sections of 500 ft. each, treated with 5% hydrated lime, one section to a depth of 2 and the other a depth of 6 inches. A second stretch of 400 ft. was established about November 1 at Matney near St. Joseph, Mo., on a heavy blue clay with 5% of lime to a depth of 6 inches. On March 1 after the winter season the Jefferson City test road was found to be in excellent condition as compared with the untreated portions particularly in the matter of freedom from ruts. This was especially satisfactory considering the trying weather of the winter season.

The advantageous results of lime treatment, however, were not so apparent on the St. Joseph road so early in the season. This was in some degree due to the fact that treatment took place late in the fall and the road was not thoroughly consolidate when freezing occurred. The ice cap which formed in December persisted for some weeks and when the break-up came there was a considerable development of mud for a short time. However, the traffic soon compacted the roadway and since that time the treated section has shown a marked advantage in comparison with the adjacent portion of the normal clay. An inspection on April 11 showed it to be in good condition.

Cost of Liming

The following tabulation offers in condensed form information relating to the various field test sections:

In all cases, except the last, the width of the roadway treated was 14 ft. The St. Joseph stretch was 20 ft. wide but the cost indicated above is, for purposes of comparison, computed on the basis of 14 ft. width.

SUMMARY OF TEST RESULTS—LIME ON DIRT ROADS

Date of Tr'tm't	Location	Kind of Material	Length of Sec. Ft.	Depth of Treatment	% wt. hyd. lime	Cost per 100 Ft.
1924	Hallsville Road					
7-10	Section 1	Clay	250	5 in.	2	$19.15
7-10	Section 2	Clay	250	5 in.	5	36.75
9-1	Section 3	Clay	250	2 in.	5	15.13
	Jefferson City Road					
9-15	Section 1	Wabash	500	2 in.	5	16.05
	Section 2	Clay	500	6 in.	5	38.26
11-1	St. Joseph Road	Clay	400	6 in.	5	48.86

The results of the investigation to date from the practical viewpoint seems to be encouraging although the effect of a long period of time on the stability of the mixtures is yet to be determined. So far, the changing moisture content, due to alternate wetting and drying, the wide ranges in temperature and the action of traffic have not destroyed the favorable effects of the lime, but it is deemed wise to extend the observations over a longer period of time.

Only negative results may be reported, however, in relation to the fundamental physical phenomena investigated; in the words of Mr. Wood—"the tests . . . do not explain the basic action which results from the lime admixture." These facts are apparently established, however; the specific gravity of the soil is only slightly reduced by adding hydrated lime; the moisture holding capacity and moisture equivalent are reduced in heavy clays; the rate of evaporation is slightly retarded; but there is a more rapid capillary movement of the moisture after treatment; the voids in the soil become enlarged allowing an increased rate of percolation; and the bearing power at the higher moisture content is increased. We can not, however, at this time offer a scientific explanation of these phenomena. It will no doubt need the co-operative efforts of the engineer, the physicist, the geologist and the colloidal chemist to lay bare the whole story of cause and effect.

Arrange Chemical Exposition Program

THE program of speakers for the intensive one-week course in chemical engineering fundamentals for college students and others in the industry to be held in conjunction with the Tenth Exposition of Chemical Industries, September 28 to October 3 at the Grand Central Palace, New York, is gradually nearing completion. Some of the leading authorities in their respective fields in the chemical industry and associated groups, will lecture at the students' course at the Chemical Exposition.

Three general addresses on the chemical industry, chemistry in all industry, and the buying and selling of chemicals will be given. Dr. Charles H. Herty, president of the Synthetic Organic Chemical Manufacturers' Association, will speak on "The American Chemical Industry"; Dr. Arthur D. Little on "The Application of Chemistry to Industry"; William Haynes on "Buying and Selling the Products of Chemistry."

Addresses on special phases of chemical engineering practice will be given as follows: "The Commercial Application of the Disintegrating Mill," by Pierce M. Travis, of the National Homogenizer Corp.; "Screening, Grading and Classifying," by Albert R. Reed, of W. S. Tyler Co.; "Handling of Materials—Intraplant Transportation," by A. E. Marshall, of the Corning Glass Works; "Heat Resisting Alloys," by Arlington Bensel, of Victor Hybinette, Inc.; "Dryers and Drying," by F. E. Finch, of the Ruggles Coles Engineering Corp.; "Conveying with Steel Belting," by James S. Pasman, of Sandvik Steel, Inc.

The speakers scheduled thus far represent about half of the finished program for the students' course, it being planned to add almost an equal number of additional well-known speakers before completion of the full program. A number of leading engineers have been scheduled tentatively, and definite announcement of their talks will be made later.

Lectures will be held each morning of the exposition at the Grand Central Palace. No charge is made for admission.

Research Activities of the National Lime Association

An Organization for Service to Both Manufacturers and Consumers

By G. J. Fink, Ph.D.
Chemical Director

THE history of the application of science to the manufacture of lime is probably best summarized by statements of N. V. S. Knibbs, a prominent chemist in the English industry, who says "The lime industry has aptly been termed the 'Cinderella' of commercial industries. Compared with others of equal importance it has been neglected by technical writers and investigators, and manufacturers have been content to use antiquated and inefficient methods of manufacture without any serious attempt at their improvement."[1]

When we consider that "lime was one of the first chemical reagents used by mankind and that lime burning is one of the oldest chemical industries," it is surprising to note the very slight improvement which has been made in the calcining of limestone, a process which is probably nearly as old as the use of fire itself. This surprise is only augmented by the fact that "perhaps no other inorganic commercial product has played so important a part in human affairs for so long a period."

Not only has this lack of progress been manifest in the production of lime but it is also apparent in connection with knowledge of the material itself and information concerning its properties in its relation to those industrial processes in which it is used. To illustrate this lack of information, it is only necessary to mention a few of the popular misconceptions concerning lime, among which the following are some of these most frequently met:

"Lime is lime." It is interesting to find, particularly among consumers, that there has been very little appreciation of the fact that limes vary not only in chemical composition, reactivity and availability but also in those physical properties which might very profitably be considered in a choice of the proper lime for the particular use. Admissions from users that they were not aware that there are the two larger groups of limes, namely calcium and magnesium, and that these different limes might have different properties, are only too frequent.

"Lime is used only for structural purposes." This perhaps is as popular a misconception as the previous one. The idea

Dr. G. J. Fink

that lime is used only for structural purposes is probably justified from the standpoint of the layman, but it is unfortunately true that this opinion is frequently found to exist among those who have considerable technical information. Strangely enough, the structural uses are practially the only ones mentioned in textbooks of chemistry and until about two years ago even chemical abstracts listed references to lime only under the structural materials classification.

"Air slaked lime is carbonated lime." It is, of course, true that lime which has been exposed to the elements for several months does carbonate to a certain extent, but it is not generally known that the first reaction taking place in the air-slaking of lime is one of hydration. That is to say, the lime first combines with water and very little carbonation takes place until the hydration process is nearly completed. It must also be remembered in this connection that unless fresh surfaces of the lime are continuously exposed, there is a tendency to form a protective layer both of hydrate and of carbonate which prevents or at least retards further hydration or carbonation. The fact is that for a large number of purposes the so-called air slaked lime is as effective as the fresh lime if in calculating charges allowance is made for the slight change in composition.

"Quicklime fines are air slaked and ineffective." A very common practice among dealers and users of lime is to fork a shipment and discard as useless the fine material. The fact is that only in exceptional circumstances is this fine material very appreciably less available or less effective than the larger lumps.

"Lime structural products depend upon carbonation for strength." It is popularly believed that practically complete carbonation of the lime in such products as mortar and plaster is attained shortly after the material is put in place. It has been shown to the contrary that frequently this carbonation is only superficial and that complete carbonation may not be attanied for ages.

"The ordinary screen (sieve) analyses determine comparable finenesses of limes." It is found that most specifications and most analytical reports give percentages of hydrated lime passing the sieves of the ordinary series down to a number 200 or 250. It is practically always true that a very large percentage of the material, usually much more than 90%, will pass this fine sieve. It is reasonable to believe, therefore, that for most uses, particularly in the chemical industries, that portion of the material passing the finest sieve determines the properties of the whole and that in order to get comparative information some data must be obtained regarding the relative percentages of particles finer than those passing the No. 250. At the present time such determinations can be made only by an air analysis or by microscopical examination.

"The relative values of limes are always determined by chemical analysis." This statement seems to be rather generally accepted as almost axiomatic, whereas there are a number of uses for which the physical properties of a lime determine its value and for which the chemical analysis, if of any value, may be only an indication.

"Determinations of available lime define the relative values of limes for all chemical processes." It is unfortunately true that to date no method for the determination of available lime has been proposed which gives a figure for all limes directly applicable to all processes in which they are used and in

[1] Lime and Magnesia, 1924, Preface page 5.

general it may be said that the method for determination of available lime which as nearly as possible involves the same conditions as those imposed in the actual use of material is most satisfactory.

"In its use in concrete lime replaces portland cement." In general, lime is used only as an admixture or as an additional material in the standard portland cement-aggregate concrete and the ratio of cement to aggregate is not disturbed.

A number of reasons might be given for these misconceptions, for the lack of technical control in lime manufacture and for the paucity of information regarding its properties and uses. Among these, perhaps, the most important is the fact that owing to the antiquity of the process, the industry has not been brought so directly into contact with the relatively recent tendency to inject technical information into industry.

Of next importance is the fact that the low price obtained for the material on the market has made it impossible, particularly for the smaller manufacturers, to add to their overhead those items which would be involved in the use of the services of a control or research chemist. Other minor reasons have been the difficulty of sampling and the lack of rapid methods which might be applied as routine in the plants.

The matter of sampling is one which unfortunately has been given too little attention. The attitude toward this is quite strikingly portrayed by a story which is told of a certain manufacturer who had submitted a sample of his material to a prospective user. When this user reported to the manufacturer that the sample which he had submitted was an excellent one, the manufacturer replied: "Well, that lime should have been good, for I picked the best lump from the pile." It is axiomatic, of course, that the sampling of the material must be as accurate as the method of analysis applied and that unless the material has been properly sampled so as to get a representative material the analysis will be worthless.

The fact that in the past the price of lime has militated against the application of technical information, particularly in respect to the smaller manufacturer, has opened up the opportunities for the pooling of interests such as resulted several years ago in the organization of the National Lime Association, an institution which is supported by manufacturers representing the larger proportion of the lime manufactured for sale.

Originally the activities of the National Lime Association were confined to a study of the properties and uses of lime and the application of this information along educational and promotional lines. As a result of a gradual growth more and more effort is recently being directed toward the problems involved in lime manufacture and the development of methods and processes for the production of products to meet definite specifications.

In order to develop fundamental information, one of the major problems of the association laboratory has been a study of the properties of limes both in the abstract and in their relation to those chemical processes in which they are required. With this basic information, a number of different lines of research have been started and a number of investigators outside of the industry have become interested in lime problems. An index of this aroused interest is the fact that 14 colleges and universities at present have a total of 40 men engaged in lime research.

The following list of subjects investigated and reported indicates the breadth and extent of these investigations:

Solubility of Limes; Availability of Limes; Causticizing Properties; Effects of Addition Agents on Rate of Slaking; Complex Compounds of Lime with Other Elements such as Iron, Alumina, Sulphates, etc.; Separation of the Calcium Oxide and Magnesium Oxide of Dolomites; the Degree of Hydration and Conditions for the Hydration of Magnesia; the Micro-chemistry of Lime; Modification of the Setting Properties of Lime Mortars; the Development of New Lime Structural Products and Units; Lime Whitewashes.

Some of the current problems under investigation are:

The Effects of Very Small Quantities of Constituents Other Than Calcium Oxide, Magnesium Oxide, Iron, Alumina, Carbon Dioxide and Water; the Possibilities of Lime in Mineral Supplements; Particle Size of Hydrated Limes; Colloidal Calcium Carbonate; Lime for Insecticides; Lime in the Treatment of Trade Wastes; Lime for Bleach Manufacture; Acoustical Properties of Lime Plasters; Sand Carrying Capacities of Limes; Methods for Lime Analyses.

One of the more interesting developments from the association work has been the aroused interest of users in possibilities of lime and the development of specifications for limes for various uses. In this latter work very close co-operation has existed between the association and the government interdepartmental conference committee on lime and the lime committees of the American Society for Testing Materials and of the American Chemical Society. Through the combined efforts of these organizations, specifications, including the following uses, have been adopted:

Mortar, Plaster and Concrete (quicklime and hydrated lime); Textiles, Varnish; Water Purification; Rag Cooking; Sulphite pulp; Silica Brick; Insecticides; Sugar; Glass; Leather; Causticizing; Sand-Lime Brick; Gas Purification. Standard methods for sampling and for chemical and physical tests are also established.

As a result of this research program, combined with efforts to compile facts already in the literature, a considerable fund of information regarding lime manufacture and the properties and uses of lime has been accumulated and cataloged for ready reference. A large number of publications have been issued not only by the National Lime Association but also by outside investigators and the association headquarters and field officers are becoming recognized as clearing houses for information. It is hoped that these officers will be more and more called upon for the facts available and that they will be looked upon as valuable intermediaries between the producer and consumer. This organization feels that the more thorough the familiarity of the consumer with the limes available and the more completely the manufacturer is informed about the requirements of materials for his customers the more satisfactory will be the business relations between the interested parties.

Technical information is being more and more injected into the manufacturing processes and into the uses of lime products. Progress in manufacture has been quite marked within the past decade as manifested by improvements in hydration and hydrators, study of kiln designs and kiln refractories and the application of known facts to kiln operation and efficiency.

Colorado Portland Cement Co. Improvements

THE Colorado Portland Cement Co. of Denver, Colo., has recently made many improvements at their Portland, Colo., plant and are in the process of making many more. The following letter from our good friend, E. J. Strock, superintendent of the company, tells of what they are doing.

"You may be interested in knowing that our 'little old plant' is still on the job. As Shakespeare said of Cleopatra, 'Age cannot wither her nor custom stale her many varied charms.' We recently completed a 5-story and basement pack house and a 17-bin 200,000 bbl. cement storage.

"We are now spending $500,000 building an absolutely modern mill building and power house. Four compebs, 8x26 ft. and a 4000 k.w. turbine are the chief items. Buildings are of monolithic concrete, artistic and with every modern convenience and improvement. Both shale and lime shovels are now equipped with caterpillar treads and, by the way, our little back number cement plant was the first in the world to have large shovels on caterpillars and an all-steel well drill.

"Paul Van Zandt is chief engineer and J. E. Griffith, C. E., assistant superintendent, is superintendent of construction. Our raw end, though old and ill designed, is now travelling at a greater rate of production than ever in the history of the plant. About 2 months should see the new machinery operating."

New Peerless Portland Cement Company Plant Really "Without a Peer"

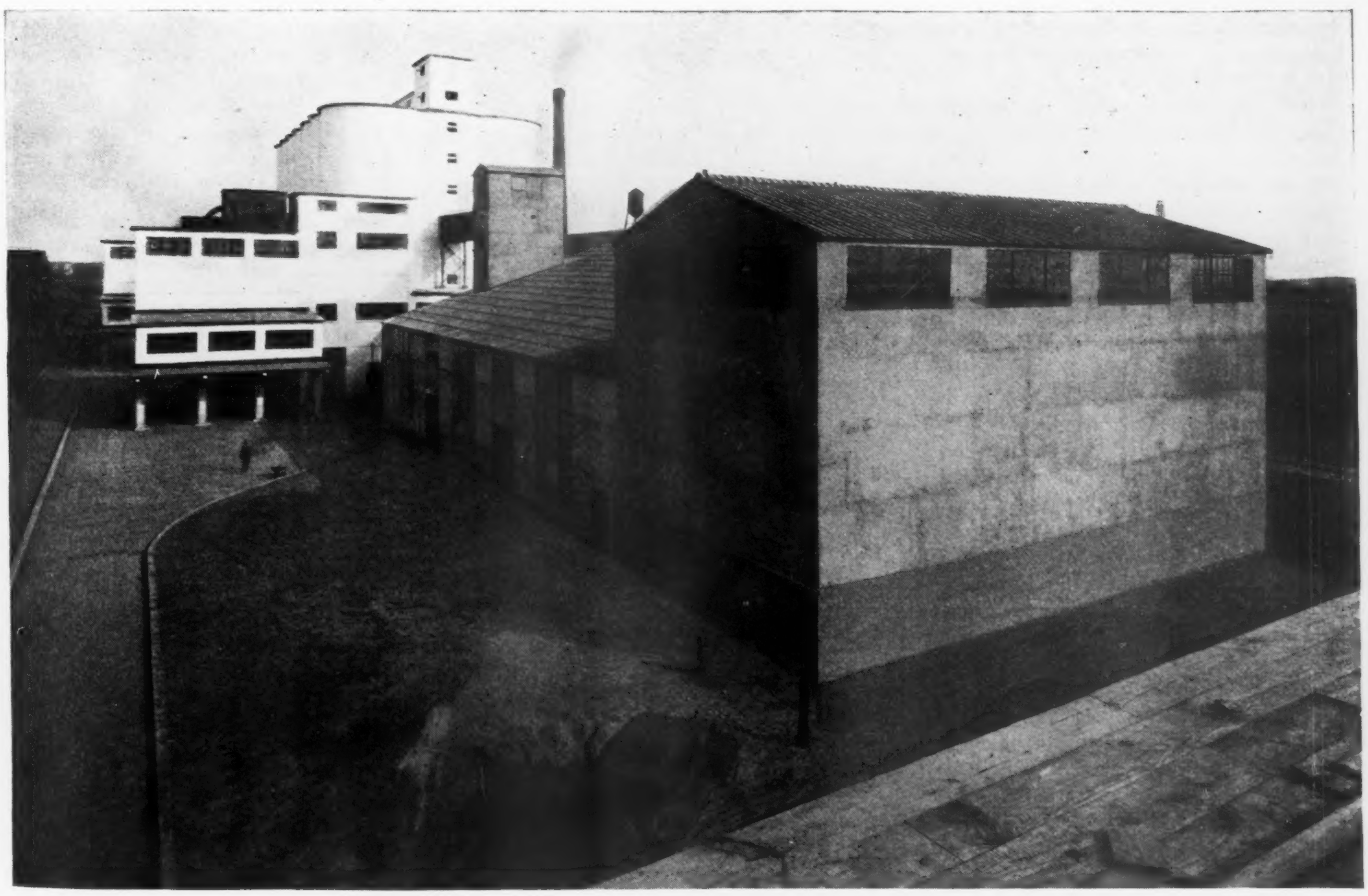
Detroit, Michigan, Plant of Peerless Portland Cement Company, an Advance in Cement Plant Design and Construction—Innovations Such as Gas Washers and Unusual System for Storage of Raw Materials—A Packhouse Without Precedent in Cement Industry

By Charles A. Breskin

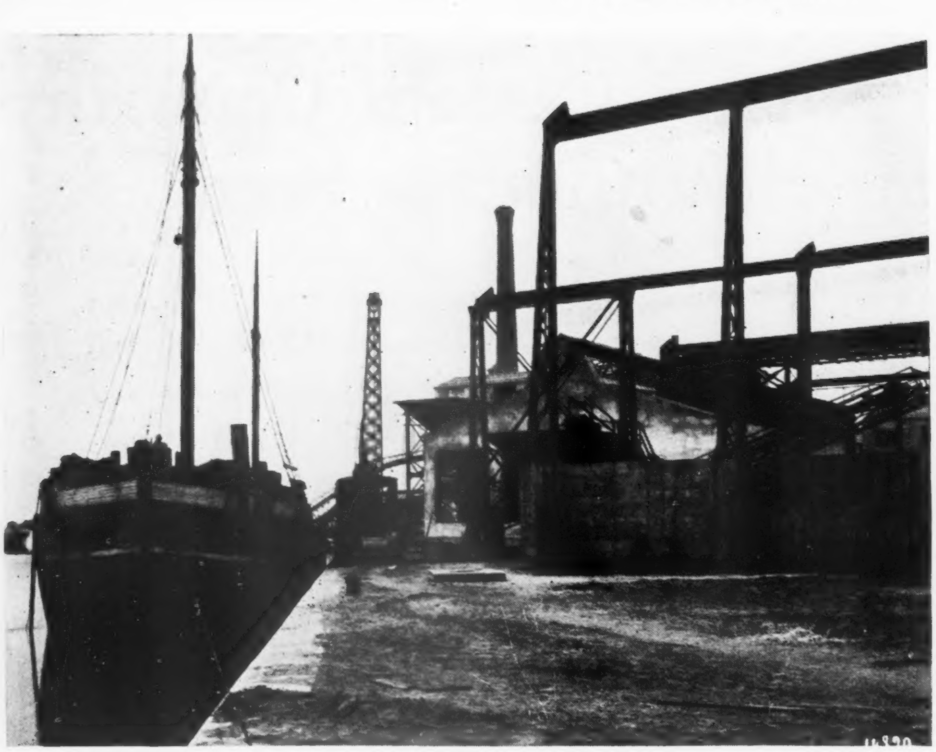
THIS is the longest "story" ever published in a single issue of Rock Products, but the editors feel that the space allotted is fully justified, for the Peerless portland cement plant, in many respects, is an epoch-marking plant.

It is built in a great city. It had to be designed to fit a city building site. It conforms to city factory building ordinances. It is designed especially to facilitate motor-truck transportation of the finished product. It contains every modern and up-to-date device for efficient and economical cement mill operation.

Coupled with all these interesting and compelling factors is a liberal management which has permitted us to describe and illustrate this plant in greater detail than is ordinarily possible. Hence we have no apologies to make for the space occupied. —The Editors.



Gypsum storage, finish mill, warehouse and packing plants, Peerless Portland Cement Co., Detroit, Mich.



Coal boat at plant dock; crawler crane unloads cargo direct to hopper over coal crusher; in background is stone-receiving hopper

THE new 4500-bbl. cement plant recently completed by the Peerless Portland Cement Co. within the city limits of Detroit, Mich., not only represents an engineering achievement but is another example of the growing tendency, when possible, to locate plants closer to the market territory and thus do away with freight charges. Located as it is, just 4½ miles from the heart of the city, the new Peerless plant has a distinct advantage from a shipping standpoint, and a tremendous sales appeal to the consumer. It makes it unnecessary for the contractor or dealer to invest in storage warehouses, since in a plant of this type he can get his supplies daily and trucking can be done economically anywhere within a radius of 25 miles from the plant.

The plant site is a triangular tract of land 10½ acres in extent. It is bounded by the River Rouge on one side and the Michigan Central R. R. and West Jefferson avenue on the other. The location makes it possible to receive raw materials by boat or by rail and to ship by either truck, boat or rail.

In designing and building of the plant it was necessary to conform to the city building code, due to the plant being located within Detroit proper, and this made it necessary to include more refinements than would have been necessary had the plant been located elsewhere. As the property adjoins the River Rouge and consists chiefly of a comparatively soft quality of clay, it was necessary to drive piling at all points where ground pressure exceeded 2000 lb. per square foot. As a matter of precaution and to be absolutely insured against settlement and lateral movement, all piers and foundations of every nature are supported on piling. Piles were driven to a depth of 75 to 80 ft. direct to bed rock. These are capped with concrete slabs of various thicknesses which in turn are tied together with an elaborate system of concrete struts and cross bracing. In all, approximately 41 miles of piles were driven in the property.

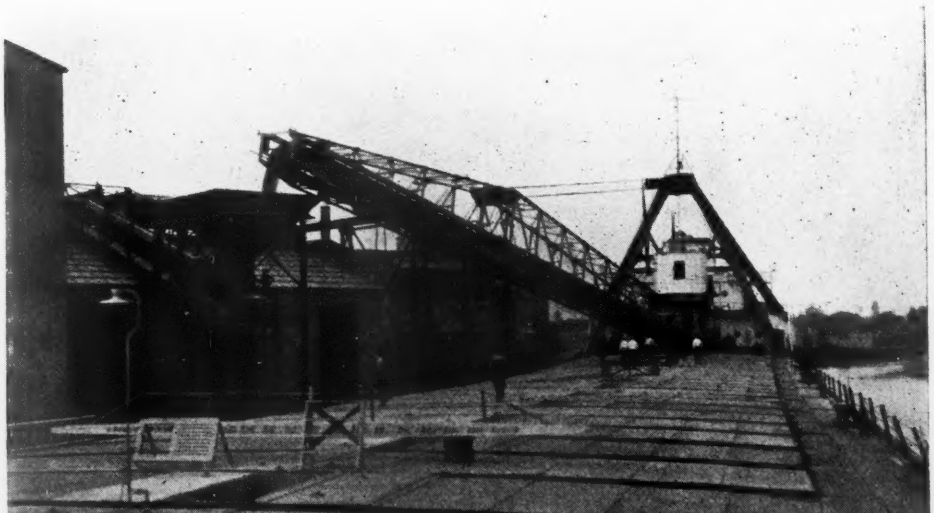
Along the River Rouge waterfront a concrete dock 863 ft. long was built. The dock has a sea wall 5 ft. above the river level and a base slab 16 ft. wide. The concrete work rests on four rows of piles driven to bed rock and spaced 5 ft. centers. A row of 12-in. interlocking sheet piling was driven back of the dock to prevent soil from working into the channel and 30 ft. back from the sheet piling is a row of anchor piles, spaced 5-ft. centers. The anchor piles, connected to the dock by 1½-in. tie rods, are also spaced 5 ft. centers. At intervals of 75 ft. along the dock are ballards for boats to tie to and expansions are provided every 200 ft.

The cement plant is located on the old channel of the River Rouge. At the time the plant was built it contained but 17 ft. of water. This was deepened to a depth of 23 ft. below the low water level and permits the largest freighters on the lake to dock at the plant.

Raw Materials and Storage

Stone is received from Calcite, Mich., in 10,000-ton, self-unloading lake steamers. The ships serving the plant are 550 ft. long, with a 60-ft. beam. They have no difficulty whatever in navigating the main channel. In fact, facilities for docking and receiving cargoes are so complete that the average boat within six minutes after its holding lines are cast out, is discharging the stone into the company's receiving hopper. Some of the accompanying photographs show clearly the method of unloading and receiving stone.

Underneath the receiving hopper is a 54-in. belt conveyor, 610 ft. center. This belt travels at a speed of 545 ft. per minute, handling 30 tons of stone per minute and permitting the unloading of a 10,000-ton boat

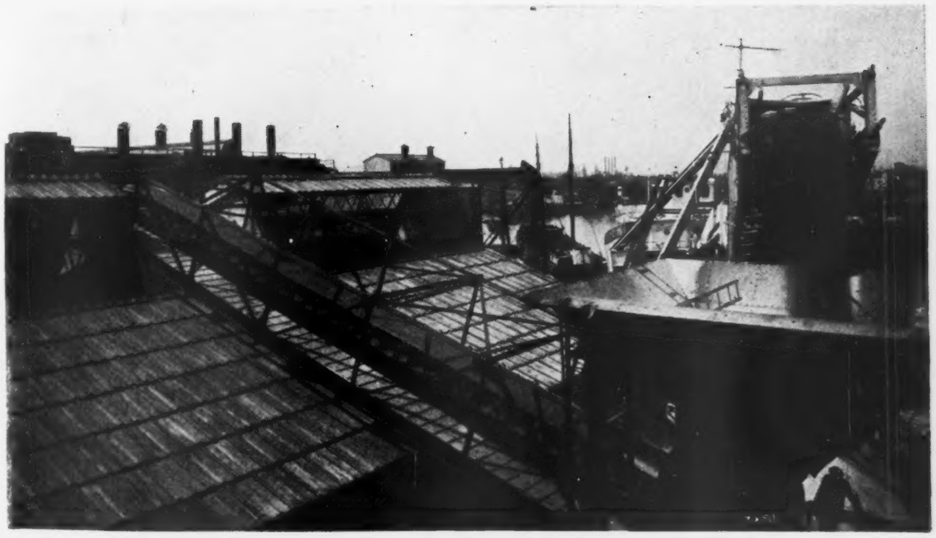


A 10,000-ton self-unloading steamer unloading the stone cargo into company's stone receiving hopper

in approximately five hours. The belt conveyor is driven by a 150-h.p. motor and has a traveling tripper running the entire length of the runway. The conveyor was furnished by the Stearns Conveyor Co. and the belt by the Gutta Percha and Rubber Manufacturing Co.

The stone from the tripper is spouted on each side of the belt into the stone storage, which has a capacity of 150,000 tons. This is sufficient to carry the plant at full capacity during the season when navigation on the lakes is closed.

The main belt conveyor is equipped with Timken roller bearings and Alemite lubricators. It has two take-ups. The one on the receiving end is a hand adjustable take-up with 48 in. of slack movement. On the driving end, directly adjacent to the compound drive is an automatic take-up with a movement of approximately 8 ft. This arrangement makes it possible to take care of 22 ft. of belt stretch without resplicing the belt.



Belt conveyor from boat discharging into hopper feeding main 54-in. belt conveyor

Main belt conveyor idlers are equipped with roller bearings and alemite system of lubrication

Looking down main conveyor toward feed end; stone is discharged on either side of belt by a two-spout traveling tripper

Overhead electric traveling crane equipped with 3-yd. clamshell bucket for distributing stone in storage and for delivery to raw mill

The automatic take-up acts as a compensator and automatically takes care of the stretch between the time when the belt is idle and when fully loaded. This amounts to an item of considerable importance considering the fact that the belt conveyor handles in excess of 30 tons of stone per minute when unloading cargoes. Since the plant has been operating six cargoes have been unloaded and the belt has not been respliced.

The limestone received is quarry screenings from the Michigan Limestone and Chemical Co. It is a high grade stone running ¾-in. and smaller in size and with a chemical analysis of better than 98% $CaCO_3$.

In the limestone storage and on each side of the belt conveyor is a 3-yd. 80-ft. span, Whiting overhead electric traveling crane fitted with a 3-yd. Williams clamshell bucket. These cranes are used for stacking stone in the storage as it is received from the belt conveyor and for transferring stone to the raw mill hoppers located at the south end of the stone storage.

Another view of stone storage and crane looking toward raw grinding department

Caustic Waste Also Used as Raw Material

The plant was originally laid out for stone operation exclusively but during the designing of the plant it was found that large quantities of precipitated calcium carbonate could be obtained from the neighboring works of the Solvay Process Co. This material is generally known as caustic soda waste and constitutes a by-product from the alkali operations of the Solvay Process Co. The material is available in quantities ranging from 250 to 400 tons per day and contains over 96% calcium carbonate with a fineness of 90% through a 200-mesh.

The waste is pumped continuously from the Solvay works through a 5-in. pipe line and provision has been made at the cement mill for the handling of several days' run. It is received in the form of slurry (containing about 65% water) in a reinforced-concrete rectangular tank, 110 ft. long, 25 ft. wide and 25 ft. deep. The material is kept in a constant state of agitation by an F. L. Smidth Co. traveling agitator. This works similarly to an overhead electric traveling crane, the device traveling the entire length of the tank on rails and reversing automatically. Agitation is effected by rotating sweeps and air jets, which form an integral part of the mechanism. Air jets are also located in the corners of the tank to prevent formation of dead pockets.

Clay and Gypsum

Clay is obtained from the company's clay pits located about 20 miles west of Detroit on the Michigan Central R. R. The clay field has a sufficient acreage to run the plant about 100 years and test borings have shown clay to be of a satisfactory composition to a depth of 80 ft.

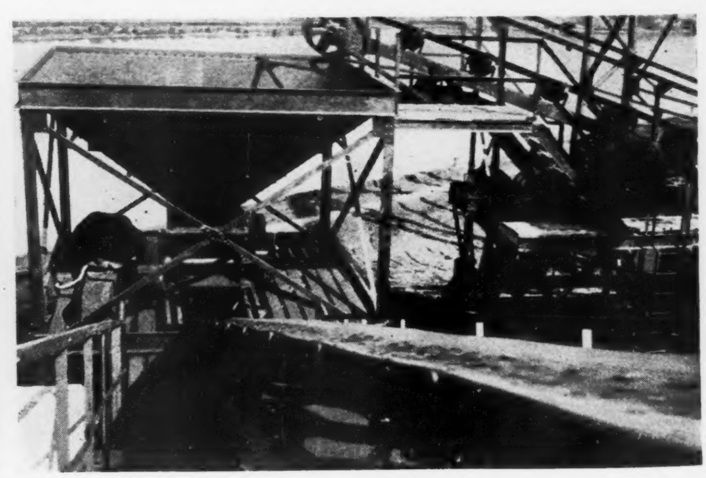
The clay is excavated by a 1½-yd. Bucyrus dragline and loaded directly into standard railroad equipment. The clay field is provided with standard gauge tracks, 80-lb. rail, and has two sidings, one for incoming empties and the other for outgoing loads. A 12-ton Whitcomb gasoline locomotive is used to haul the cars between point of excavation and the railroad sidings. The clay field is provided with houses for workmen and has all modern conveniences.

Gypsum is obtained from the vicinity of Grand Rapids, Mich. It comes in box cars and is unloaded to the gypsum storage, which is 36 ft. wide, 80 ft. long, and surrounded by concrete retaining walls 12 ft. high. The gypsum storage has a capacity of 2000 tons. Gypsum is handled and reclaimed by a Whiting overhead electric traveling crane fitted with a 1-yd. Williams clamshell bucket. The crane delivers the material to a hopper mounted over a Richardson automatic scale in the finish grinding department.

Coal

Provisions have been made to receive coal by either rail or water. The yard trackage system is so laid out that one track is set aside exclusively for coal cars. This track is equipped with a hopper for receiving coal. Underneath the hopper is an apron feeder which controls the flow of coal to a 30-in. belt conveyor 400 ft. centers located in a tunnel which passes under the bag house and stone storage, terminating at the coal crusher. The coal crusher is located next to the coal storage and at the dock end, so as to permit the receiving of water shipments. The coal crusher is a Pennsylvania, roll type, with an all-steel frame, and is driven by a 50-h.p. motor through a Link-Belt silent chain drive. All coal, whether received by boat or rail, goes through this crusher.

Limestone storage from raw mill; in the background is the coal and clinker storages



Coal conveyor discharging to coal crusher and belt conveyor which delivers crushed coal to storage

Coal from the crusher is transferred over the wall of the storage by a 30-in. belt conveyor. The system is so arranged that four cars of coal can be put over the walls of the storage without necessitating the use of the crane traveling over the coal storage.

The belt conveyors handling coal were also furnished by the Gutta Percha and Rubber Co. Conveyors and idlers and all structural work pertaining to coal conveyors and coal hopper and crusher, were furnished by the Stearns Conveyor Co.

It is a noteworthy fact that all of the belt conveyors in the plant are equipped with Timken roller bearings and the Alemite system of lubrication. Coal conveyors are equipped with drives and automatic take-ups similar to the main stone conveyor mentioned previously.

Yard System

The yard system consists of six railroad tracks with facilities for shipping and receiving material by rail, water, motor truck or electric traction. Of the six tracks, two are set aside for shipping of cement, one for coal, one for clay, one switch track, one for gypsum and a spur running into the clay building. The system is so arranged as to make possible street railway shipments, connection being made on Jefferson avenue. The Michigan Central R. R has a connection directly into the yard.

As mentioned previously the plant site is a triangular plot of land and the design was made to conform to property lines. A straight line plant would have been more desirable, but with this arrangement a great amount of storage would not have been possible and, inasmuch as this was absolutely necessary the plant was laid out accordingly. A certain amount of conveying was necessary to get great storage, thus accounting for the system of conveyors, which are working very satisfactorily.

Overhead electric traveling crane and clamshell bucket which unloads clay into storage and then transfers to wash mill hopper

Practically all the property space is taken up by buildings and storages and only enough room is left over for the driveways between the various departments. It is the intention of the company to pave all driveways eventually. Up to the present time considerable paving work has already been done from the streets to the packing department so as to enable trucks to get in and out with ease.

The arrangement for the driveway to the packing plant is shown in one of the accompanying drawings. The pavement is 9 in. in thickness and bounded by curbing 12 in. wide. It was anticipated that the major portion of shipments would move by motor truck and no expense was spared in providing facilities for this kind of transportation.

Clay building showing wash mill hoppers and caustic waste tank in background

General Construction

All the buildings throughout the plant are of structural steel enclosed with "gunite" walls and covered with cement tile roofs. The general appearance is extremely neat and pleasing to the eye. Steel sash is used throughout and such things as gutters, flashes, etc., are constructed of copper. Plenty of window space was provided for natural illumination and great attention paid to ventilation. Each building has its own toilet facilities consisting of the most modern type in industrial plumbing and sanitary equipment.

All of the electrical work between the power house and the various departments is underground and laid in fibre conduit enclosed in concrete. All cables are lead covered and entirely waterproof. The electrical work in the interior of the various buildings is carried in underground conduits as far as possible and wherever wires rise above ground lines they are enclosed in metal conduits. It is noticeable that no open wiring appears anywhere in the plant; even the electric light circuits are carried in metal conduits that are partially con-

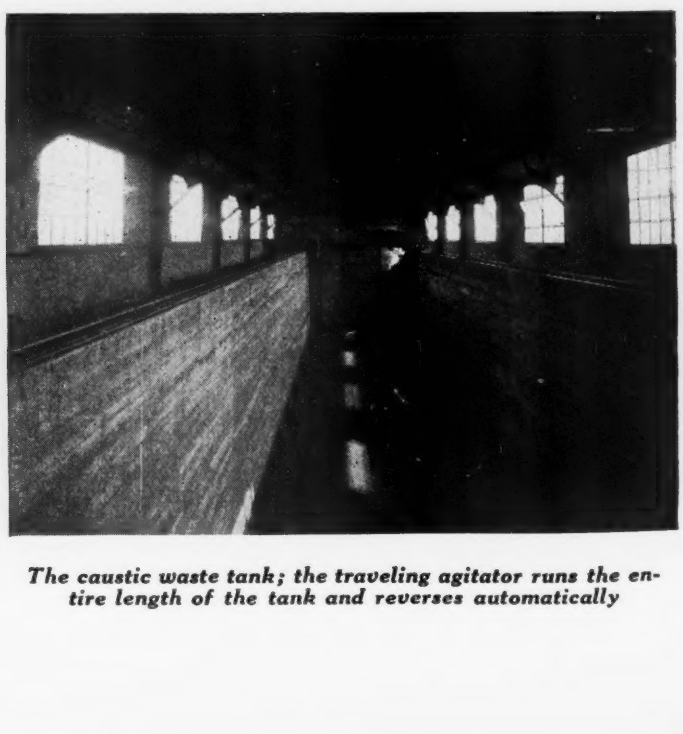
The wash mill hoppers, wash mill, clay storage tanks and caustic waste tank; note short center belt drives on wash mill agitators

cealed as required by the city building code.

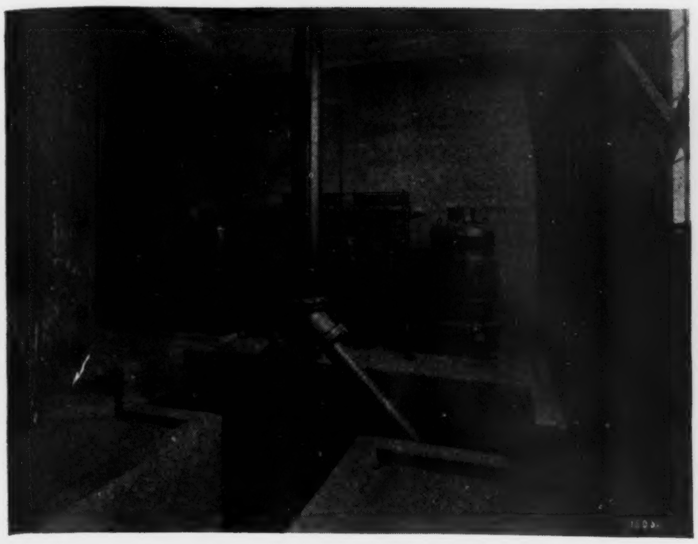
At the present time several of the buildings are provided with steam heat and work is under way now toward completing the system so that all buildings will be at a comfortable working temperature during the winter season.

Adjacent to the kiln building and to the east of it is the machine shop and stock room. This building is 48 by 180 ft. and contains all machine tools for any maintenance work. The equipment consists of a

Mechanical system of agitation on clay storage tank; the drive is a 25 h.p. motor through a speed reducer



The caustic waste tank; the traveling agitator runs the entire length of the tank and reverses automatically



The 50 h.p. vertical motor drives the 6-in. centrifugal pumps delivering caustic waste to clay wash mills; one is a service unit and one a stand by

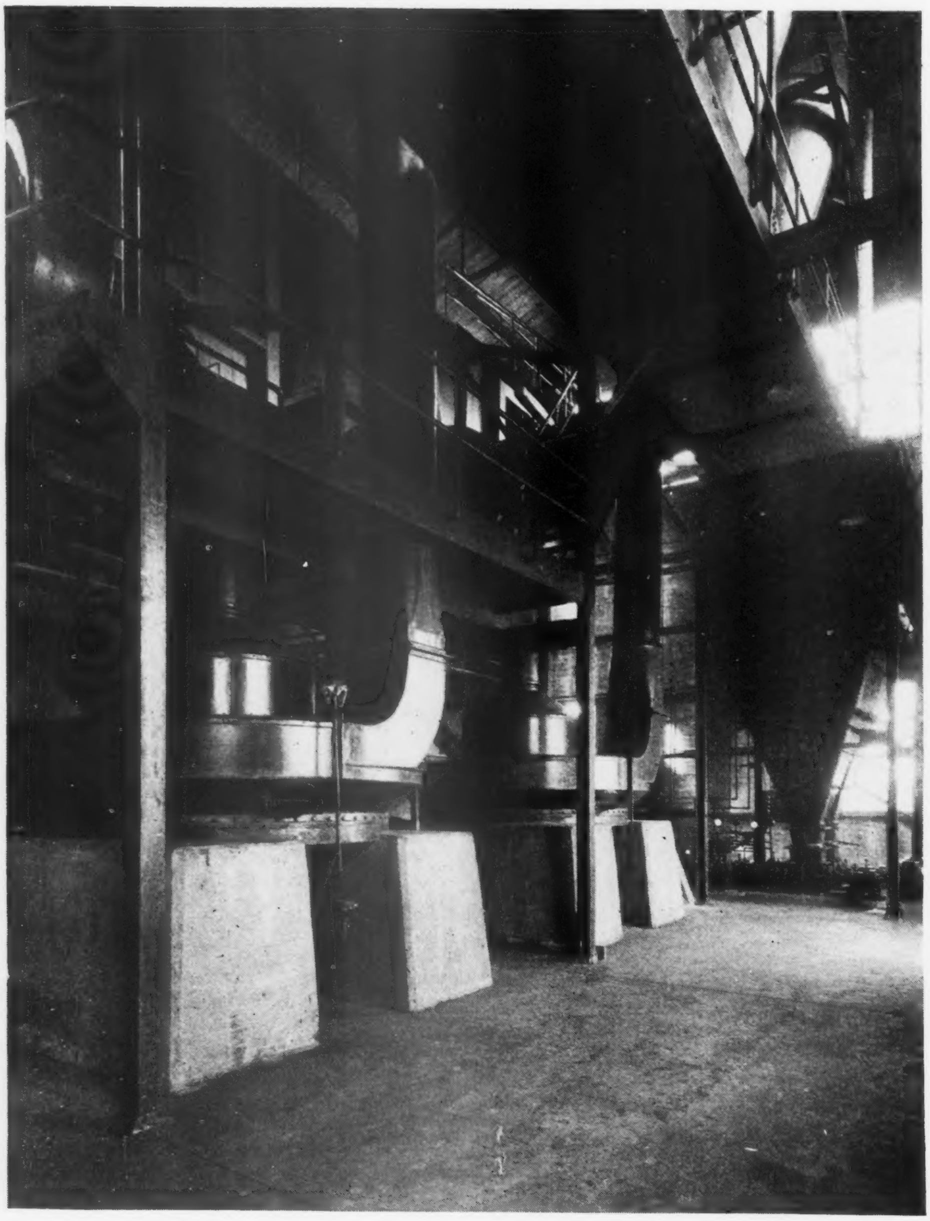
The 10-h.p. variable speed motors driving 3-in. centrifugal pumps delivering clay and caustic waste to raw mill; one unit is for service and one a stand by

The rotary kilns from the firing floor; the kilns are 11 ft. in diameter by 175 ft. long

The kiln foundations are monolithic block of concrete resting on piles; the space between is for slurry storage

Motor driven fan, as washer, economizer and waste heat boiler in boiler house

Second floor of power house containing turbo-generator units and main switchboard



Coal pulverizing department; special air pumps for conveying coal to kiln bins are in the background

planer, radial drill press, two lathes, shaper, arbor press, upright drill press, speed drill, high speed, large capacity hack saw and combination punch and shears. All of this equipment is power driven. The stock room contains the general operating supplies and maintenance parts. It is equipped with metal bins and shelving and is divided from the machine shop by a metal partition. The building is equipped with a 5-ton Whiting overhead hand-operated crane which passes through the center of the machine shop and stock room and permits the handling of all heavy parts.

Power House

The power house consists of a two-story building 45 by 60 ft. The first story or basement has a clearance of 13 ft. and contains the high tension apparatus and oil switches pertaining to the main switchboard. It also houses the condensers, circulating pumps, the pumping and filtering system and the pumps from the heating system.

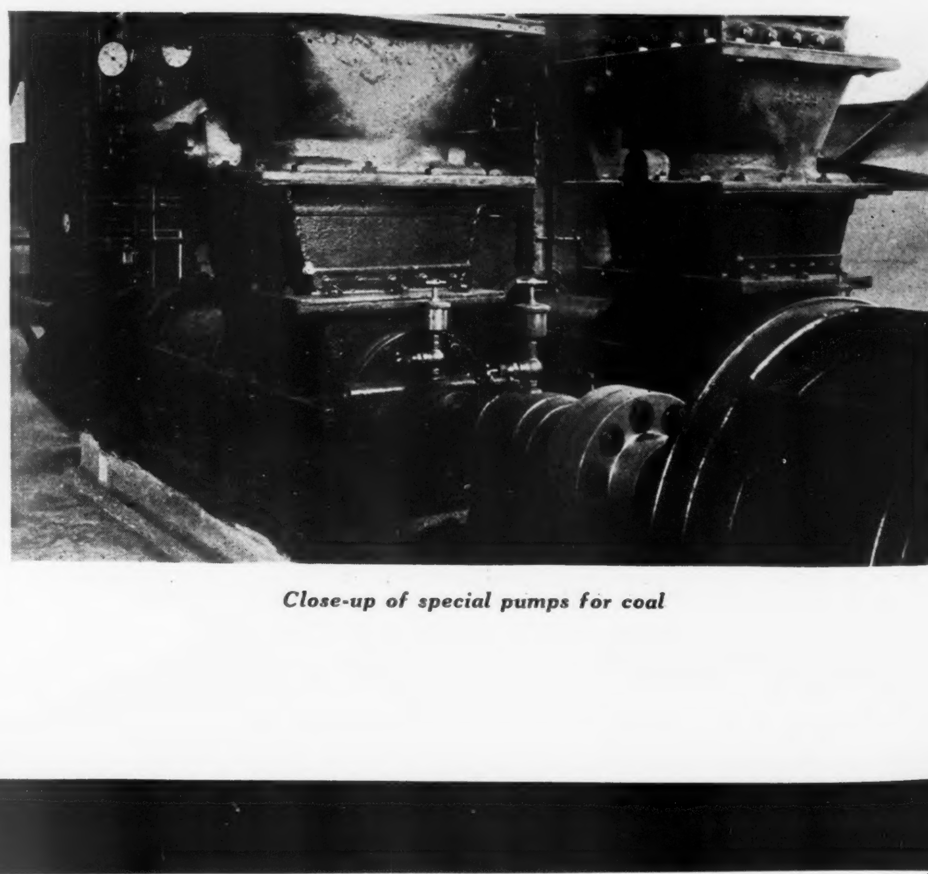
The second floor contains the main switchboard, turbo units and motor and generator sets. This floor is equipped with a 10-ton Whiting overhead, hand-operated crane, 45 ft. span, for facilitating repair work on the main generator units and auxiliaries. A section of the floor in the turbo room consists of removable subway grating so that it is possible to move heavy machinery from the second floor of the power house to the first and vice versa.

The generating units, furnished by the Ridgeway Dynamo and Engine Co. consist of two 3000-k.w. turbo-alternators. These generate 3-phase, 60-cycle current at 2300v. Each unit has a direct connected excitor set and operates at 200 lb. steam pressure and 100 deg. superheat, with a water rate of 14 lb. per k.w. hour. Each unit is equipped with Elliot surface condensors, 6000 sq. ft. of surface to each. These condensors are of the compact type, the circulating and condensate pumps being driven by the same motors.

The vacuum is maintained by Elliot type of injectors. Due to the large quantity of condensing water available (taken from River Rouge) and its relatively low temperature it is possible to maintain a vacuum in excess of 28 in. during the summer months.

The auxiliary units consist of two 150-k.w., 250-v., d.c. generators. One is driven by a Ridgeway synchronous motor and the other by a Terry steam turbine. The auxiliary units supply d.c. current for excitation for the various synchronous motors and for the operation of magnetic clutches and magnetic separators.

The switchboard was furnished by the Westinghouse Electric and Manufacturing Co. and contains all controls for power house and various circuits throughout the plant. The switchboard instruments are very complete and besides including the usual indicating instruments it is equipped



Close-up of special pumps for coal

with devices for recording electrical consumption, power factors, etc. The operating portion of the switchboard is located in the turbine room and the balance in the basement. With this arrangement there is no apparatus above the turbine room floor line over 250-v. All 2300-v. equipment is isolated in the basement and protected with wire screens.

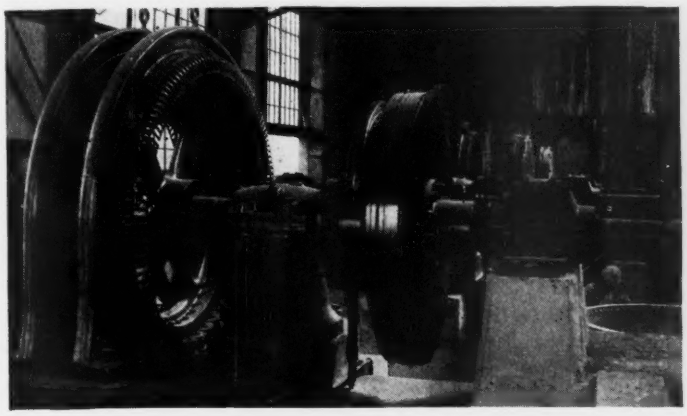
In addition to the cement company's power plant there is also a 500-k.w. connection with the Detroit-Edison Co.'s power line. This is used in cases of emergency. Provision is made so that the connection can be increased to 1000-k.w. if necessary.

Cars loaded with clay, as received, are run directly into the clay storage building, where

Clay Department

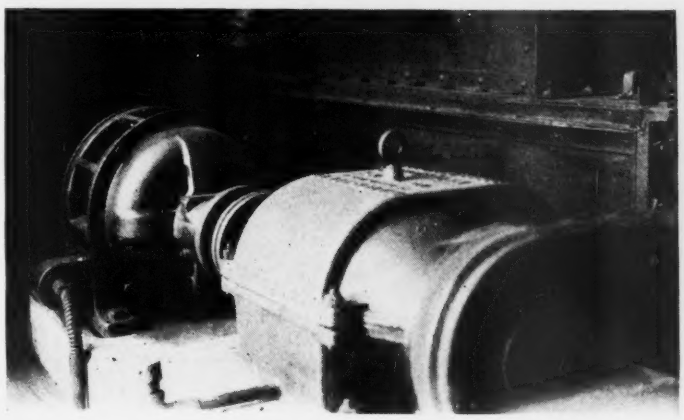
they are unloaded by a Whiting overhead electric traveling crane and equipped with a 3-yd. Williams clamshell bucket. The crane dumps either into storage or into the wash mill hoppers, located at one end of the storage. This arrangement permits reclaiming of all clay and charging to two 26-ft., F. L. Smidth Co. wash mills, which are driven by 75-h.p. motors through short belts and Lenix drives. Moisture is added as the clay is charged into the hoppers. The wash mills are arranged so as to be operated continuously or intermittently. The washed clay passes through a series of screens into a storage basis 45 ft. long, 20 ft. wide and 20 ft. deep. The storage basin is equipped with agitating machinery designed by the company's engineers but built by the Palmer-Bee Co. (hereafter referred to as the "Peerless system of agitation"). The agitator is driven by a 25-h.p. motor through a Palmer-Bee speed reducer.

The caustic waste is taken from the rectangular tank by a 6-in. vertical type Morris centrifugal pump and discharged into either of the two wash mills. A definite quantity of caustic waste is placed in the wash mill and to this is added a certain yardage of clay. The two ingredients are then intimately mixed and form the equivalent of clay with a very high lime content. The excess water found in the caustic waste is

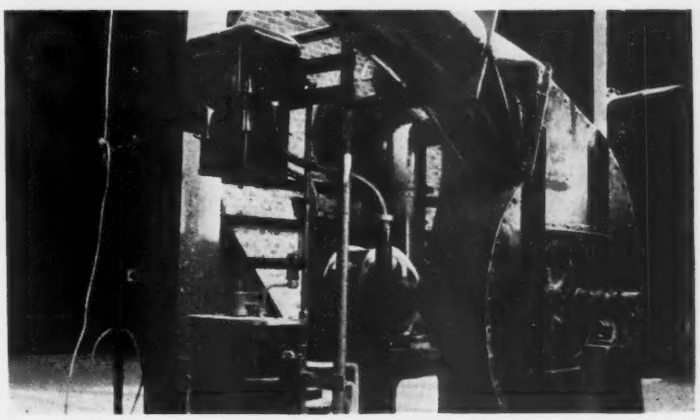


Sychronous motor and magnetic clutcher in raw mill

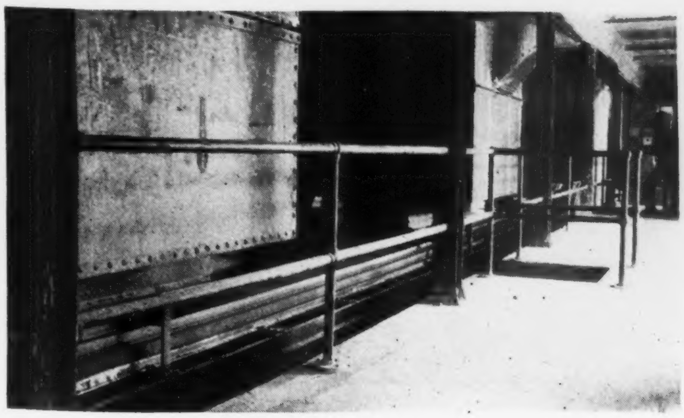
One of rotary coal dryers



Typical drive for screw conveyor units



Fan and controller unit ahead of each kiln



Clinker pits and pan conveyor underneath kilns

Clinker storage showing pan conveyor in background

The stone and clinker storage, with the kiln building in the background

used up in the process of washing the clay. It is not sufficient, however, to complete the operation and additional water is obtained from an independent source. The wash mills are used alternately and perform the functions of a batch mixer as well as performing the washing operation. A 3-in. Morris vertical type centrifugal pump takes the mixture of clay and caustic waste and delivers it to the raw grinding department.

Duplicate pumps are provided for taking caustic waste to the wash mill, and clay and caustic waste to the raw grinding department. One pump in each case serves as a standby and is for the purpose of insuring continuous operation. The 6-in. pump is direct connected to a 50-h.p. General Electric Co. variable speed vertical motor and the 3-in. to a 10-h.p. G.-E. variable speed vertical motor.

Raw Grinding Mill

The raw mill contains three 7x26-ft. Traylor 3-compartment mills direct-connected through 60-in. Cutler-Hammer magnetic clutches to 500-h.p. Ridgeway synchronous motors. Foundations are provided for a fourth mill in the event the insallation should prove desirable.

The limestone from the storage is taken by the bucket cranes and delivered to hoppers located over the feed end of the tube mills. Next to the stone hoppers and inside the raw mill building are parabolic shaped feed troughs into which the mixture of washed clay and caustic waste is pumped. The troughs are equipped with agitating devices and overflow weirs so as to maintain a constant level and consistency of material. The overflow is piped back to storage basin in the clay department.

An opening is provided in the bottom of each feed trough for each compartment mill and the quantity of the mixture discharge is regulated by a series of feed nozzles. The limestone, clay and caustic waste is received at the feed end of the compartment mills and enters the first compartment as a mixture of all three ingredients. The percentage of moisture in the feed troughs is held at a point where it will produce the correct percentage of water and slurry leaving the compartment mills.

A steel trough with a 10 deg. slope takes the discharge from the compartment mills to a circular tank 6 ft. in diameter and 6 ft. high. This tank acts as a sump for a centrifugal pump which conveys the slurry to the slurry tanks. The pump in this case is a 5-in. Morris centrifugal horizontal type, direct-connected to a 30-h.p. variable speed motor. An additional pump is provided as a standby unit.

The slurry tanks are four in number, 20 ft. diameter by 24 ft. high, constructed of reinforced concrete, equipped with the Peerless system of mechanical agitation and supplemented by air agitation. The tanks are elevated so as to permit their contents to be discharged into connecting basins located directly adjacent. The correcting basin is an oblong concrete structure, 20 ft. wide, 20 ft. deep and 60 ft. long. This is equipped with the Peerless system of mechanical agitation. An 8-in. Morris vertical centrifugal pump direct-connected to a 50-h.p. variable speed vertical motor transfers the slurry from the correction basin to the storage in the kiln building. A duplicate pump is provided for standby purposes.

The chemical laboratory is located next to the raw mill department and forms a portion of the same building. It has two floors, the lower being used for physical work and the upper for analytical work. The location is novel, as it is so readily accessible to the raw grinding department, and at the same time within a very short distance from the finishing mill and packing department. The laboratory is equipped with the most modern apparatus.

Kiln Building

The kiln building is a structure 320 ft. long and 80 ft. wide and contains the waste-heat boiler department as well as the kilns and slurry storage basins. By reason of the restricted ground area available it was not possible to use clinker-coolers to advantage and outside storage is depended on for the

Finish grinding department; the conveyor in the foreground discharges to a hopper located over scales for weighing and proportioning clinker and gypsum

accomplishment of clinker cooling process.

There are three kilns each 11 ft. in diameter, by 175 ft. long. The kilns were built by the Traylor Engineering and Manufacturing Co. and are of the two-tire type, having the same diameter throughout the entire length.

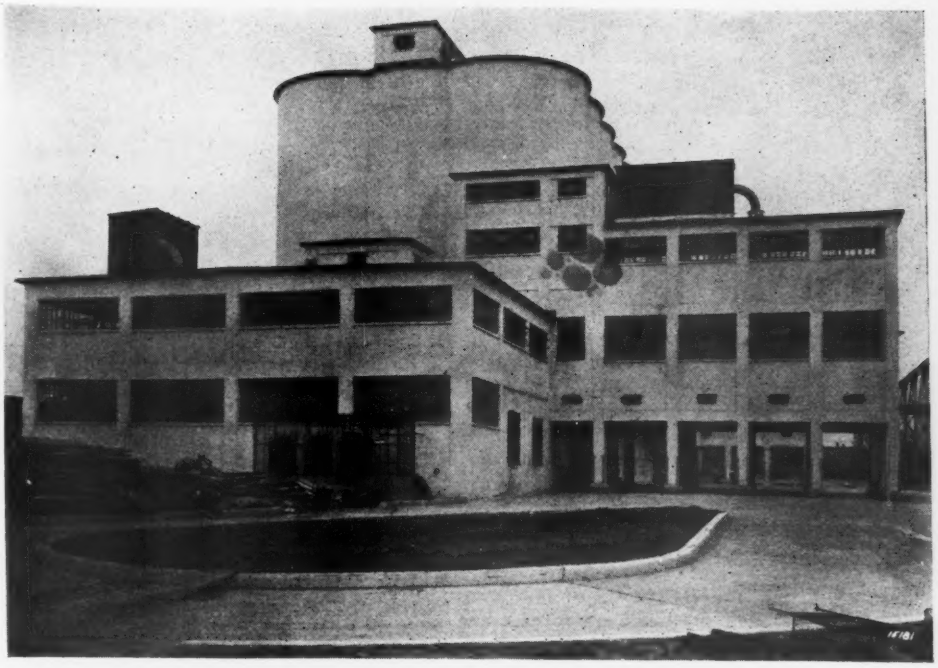
The kiln foundations consist of two monolithic blocks of concrete resting on piles driven to bed rock. The space between the kiln piers is taken up by a very large slurry storage, consisting of three tanks, 20 ft. wide, 20 ft. deep and 45 ft. long. The tanks may be used separately or collectively and serve the purpose of correcting basins as well as slurry storage. The tanks are equipped with the Peerless system of mechanical agitation.

A 4-in. Morris vertical centrifugal pump direct-connected to a 40-h.p. variable-speed motor takes the slurry to the feed troughs above the kilns. Here, as in all other departments, a duplicate pump is provided as a standby. The kiln feed troughs are of the same design as the troughs used in the raw mill. An overflow pipe takes excess slurry back to the storage tanks.

The kilns are set at a pitch of ⅜ in. to the foot and are driven by 75-h.p. variable-speed motors direct-connected to the kiln trough a flexible coupling. At full speed the kiln makes one revolution every two minutes. The variation in speed makes possible one revolution in four minutes, if necessary.

The kilns are lined throughout with A. P. Green Co. fire brick. In the hot zone 30 ft. is lined with the "Kruzite" brand of high alumina brick. Two thicknesses of linings are used, 9 in. in the greater portion and 6 in. liners in the balance. No insulation is used between the brick work and the kiln shells. It is the intention of the company to operate without insulation unless conditions prove the desirability of insulation.

A very heavy cast steel distortion ring is attached to the kiln shell midway between the tires. Also, another heavy cast steel distortion ring is located 4 ft. from the discharge end of the kiln. This particular distortion ring is built in the form of an extremely heavy flange union with faces held together by bolts. This arrangement permits the replacement of the 4 ft. section at the hot end of the kiln, in the event it should become burned, and this can be done without cutting rivets and then reriveting.



South end of packhouse and bag storage; the dust collector on the right is connected to the packing machines and the one in the left to the bag cleaner

Individual-Kiln Waste-Heat Power Units

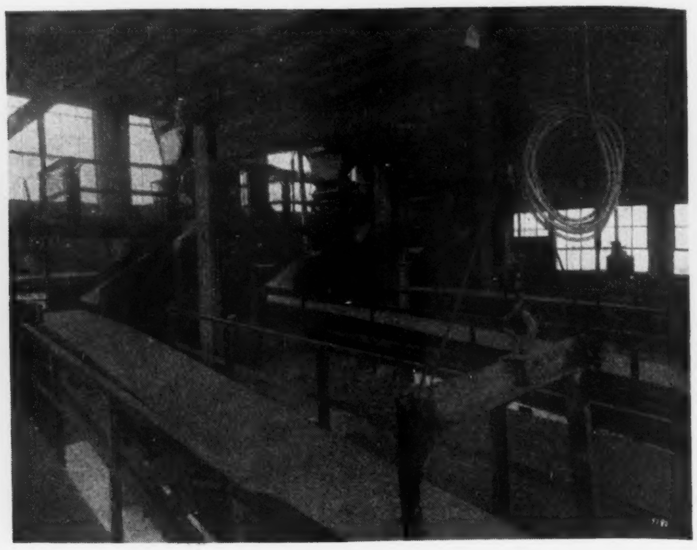
Each kiln is connected to an individual waste-heat unit consisting of boiler, economizer, dust washer, fan and by-pass flue. No common flue was used as the company is a strong believer in individual regulation for each kiln.

The waste heat-boilers were furnished by the George T. Ladd Co. Each of the 3-pass, 2-drum vertical type and contains 10,000 sq. ft. of heating surface. The boiler was designed for 225 lb. working pressure and 100 deg. super-heat. Each boiler unit is designed to deliver 24,000 lb. of steam per hour when the kiln is making 1,880 bbl. per day of cement. The super-heaters are located in front of the first pass of boilers and come in contact with the waste heat before it goes to the waste heat boilers. Superheaters were furnished by the Super-heater Co. of New York.

The economizers (Sturtevant) are of the horizontal type and contain 5000 sq. ft. of surface each. The gas washers (Bailey Manufacturing Co.) are arranged to take the gases directly from the economizers or

Screw conveyors and drives underneath the silo storage; each screw conveyor is driven by an individual motor through a speed reducer

Bates 3-valve packers in south packing plant; note spout connections to dust collectors There are seven units in both pack houses

Reversible belt conveyors in south packing plant; these are pivoted at one end, and can be raised or lowered for truck loading by motor hoists; by reversing the belt shipments are directed to railroad cars

through a by-pass flue from the kilns, as it is desirable to remove the dust from the kiln gases whether going through the waste-heat system or around it. The necessity of the by-pass flue becomes apparent. Water-cooled dampers are located in front of the waste-heat boilers and in the by-pass flues. All connections between kilns, waste-heat boilers and gas washers are of heavy steel plate construction lined with Sil-O-Cel insulation. Four inches of insulation is used in all the flues and the insulation is attached directly to the steel plate work by plastic cement and wire netting. The inside insulation is protected by 1-in. of special high temperature cement.

A short vent stack is provided for each kiln and is equipped with a mushroom valve at the top. These are only used for cooling off kilns. Each kiln unit is equipped with a Bailey fan for controlling draft either through or around the boilers.

The operation of the gas washers (this is the first American cement plant to install gas washers) is very satisfactory and tests conducted so far indicate approximately 98% of the dust passing through the waste-heat system has been carried away with the wash water used in the scrubber.

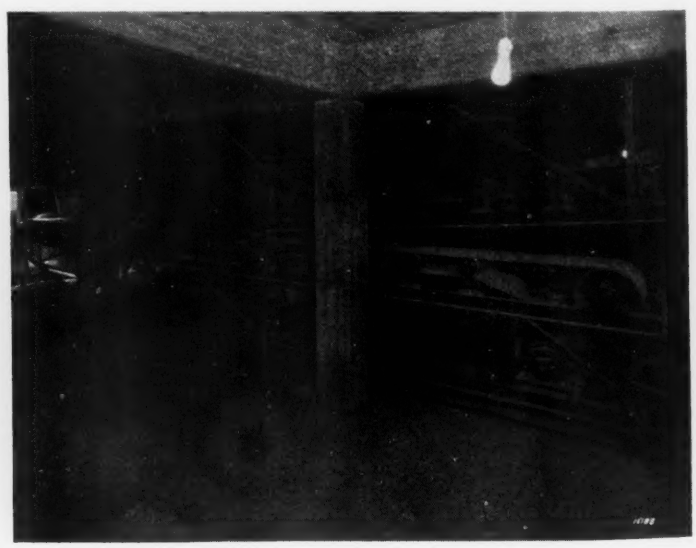
The boiler plant is also equipped with a 500-h.p. Ladd 3-drum vertical type boiler. This serves as an auxiliary unit and is completely equipped with Fuller-Lehigh burners and combustion control for pulverized coal feed. The furnace is designed for 225% of the boiler rating which can be easily reached with the apparatus provided. Steam on this boiler is also produced at 225 lb. pressure and 100 deg. super-heat. This boiler is used only in the event that one of the waste-heat boilers is out of service.

The boiler house also has a Fulton open-type feed-water heater, a four-stage turbine-driven boiler feed pump and a 3000-gal. per min. motor-driven pump for supplying the gas washers with water. A 6-in. general service centrifugal pump is also provided. Duplicate pumps are provided in all cases as standby units.

Half of the auxiliary power machinery is steam driven and half electrically driven for the purpose of obtaining a proper heat balance in the power house service. A system of steam-flow meters draft gauges and recording devices of all natures are being installed so as to provide accurate controls for all functioning parts.

Clinker from the kilns is discharged to clinker pits underneath of which is a 24x24-in. malleable iron pan conveyor (Chain-Belt Co.) The clinker pits are of steel plate lined with firebrick and act as preheating chambers for air combustion. A special design of burner is used which permits 80% of air used for combustion purposes to be taken from the clinker pits and the remaining 20% from the kiln room. Induced air for forcing pulverized coal into the kilns is supplied by individual motor-

Machine shop and stock room where all maintenance work is done and maintenance supplies and tools stored



Stationary shuttle conveyor and traveling belt conveyor for loading into railroad cars

driven Baily fans. Fuller-Lehigh coal feeders are used.

The clinker conveyor runs at right angles to the axis of the kilns receiving clinker from all three pits ,and then rising at an incline of 28 deg. and terminating at the clinker storage, which is located adjacent and parallel to the kiln building. The discharge end of the clinker conveyor is 25 ft. above the floor line of the clinker storage and permits the accumulation of a large amount of clinker before it is necessary to remove it with a crane.

The clinker storage is an open structure 80 ft. wide and 210 ft long and surrounded with concrete retaining walls 10 ft. high. The crane rails are 40 ft. above the floor line. A Whiting overhead electric traveling crane with a 3-yd. Williams clamshell bucket handles clinker in storage. The clinker storage capacity is 100,000 bbl. The same structure holding the clinker storage is continued 270 ft. to the river front and forms the coal storage, which has a capacity of 15,000 tons. The same crane handles both clinker and coal.

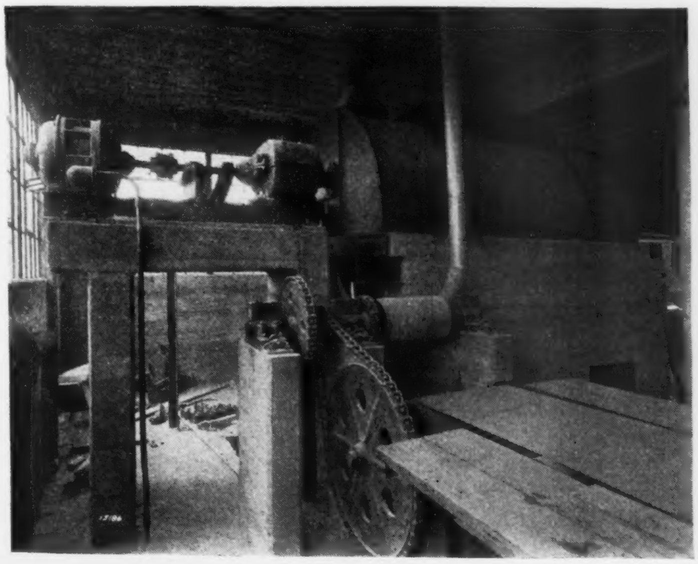
The coal and clinker and limestone storages are adjacent to each other, with the stone storage so arranged as to permit it to be used for clinker storage during the winter months when the stone is being taken out and used in process. It is the intention of the company to grind the accumulation of clinker during spring and early summer and provide room for the accumulation of limestone before navigation closes.

A. F. Miller, consulting engineer, who who designed and superintended construction of the Peerless plant

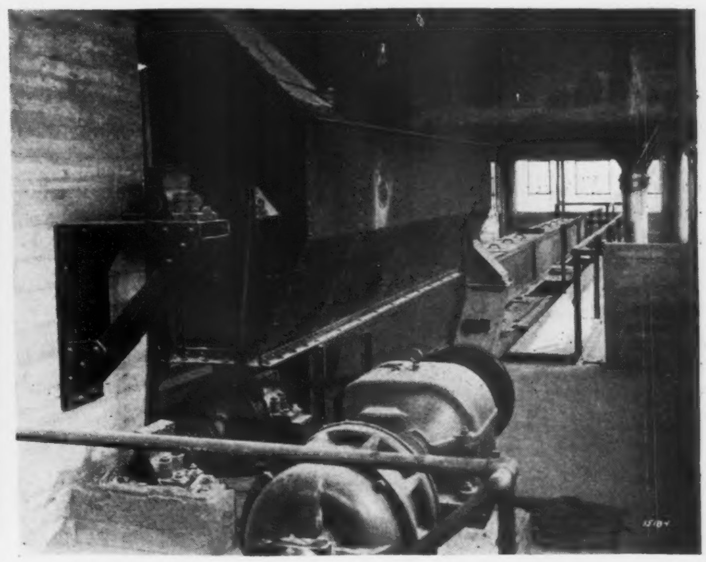
Coal Department

Coal is taken from the storage pile by the crane and deposited in hoppers within the storage but outside of the coal mill. Underneath the hoppers are two Schaffer poidometers, fitted with Ding's magnetic pulleys. The poidometers feed and measure the coal into two No. 10-A Ruggles-Coles dryers. The dried coal is discharged into a screw conveyor and elevator and conveyed to bins ahead of the coal pulverizers.

There are two Raymond Super-Mill coal pulverizers direct-connected to 200-hp. motors through flexible couplings. These mills are equipped with fans and a dust-collecting system of the latest type. The pulverized coal discharges into a 30-ton tank located over two 8-in. Fuller-Kinyon pumps. A completely automatic controlled Fuller-Kinyon pipe line system delivers the coal to the rotary kilns and to the auxiliary boiler.



Bag conveyor and bag cleaner and drive

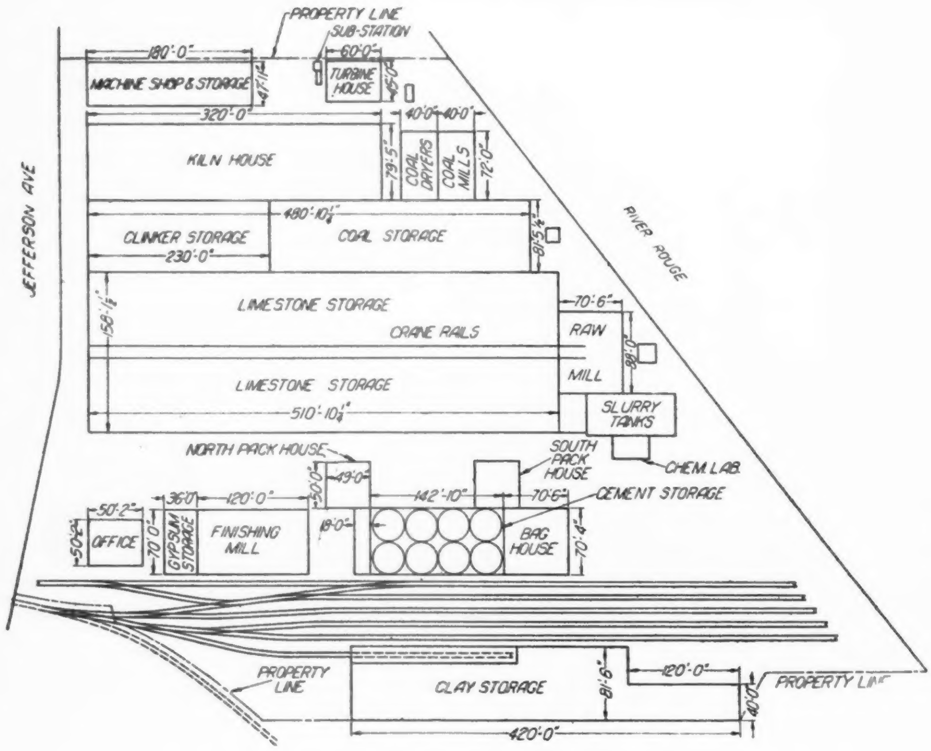


Conveyor and drive in the south packing house

The freight yard of the Peerless plant

Finish Mill

A concrete tunnel was constructed from the kiln building to the finish grinding department. This passes underneath the clinker storage and limestone storages, and is equipped with a 30-in. "Rex" (Chain-Belt Co.) steel pan-conveyor. Spouts are provided in the roof of the tunnel to permit clinker being drawn from the storage and into the pan-conveyor. As the conveyor enters the finishing department it rises at an angle of 25 deg. and discharges into two clinker bins, located over two Fairbanks weighing hoppers and scales. The scales have a capacity of 5 tons each and are used



General plant layout showing arrangement of building and storages with confines of property lines

for weighing and proportioning the required amount of clinker.

A Richardson automatic scale weighs the gypsum. This operates in synchronism with the clinker scales, thus assuring the proper ratio of clinker to gypsum.

The scales discharge into a 24x36-in. pivoted bucket carrier (Chain Belt Co.) which encircles the battery of finish compartment mills ,each 8x26 ft., and each driven by a 650-hp. Ridgeway synchronous motor through a 66-in. Cutler-Hammer magnetic clutch. Foundations have been provided for a fourth mill.

The object in having 8x26-ft. mills in the finish department and 7x26-ft. mills in the raw end is to enable the plant as a whole to quickly respond to a heavy demand for the finished product, it being reckoned that, due to slack periods, the smaller size mills in the raw-grinding end will be capable of keeping a surplus of clinker in storage in normal times. A Sly dust collector is being installed in the finish department.

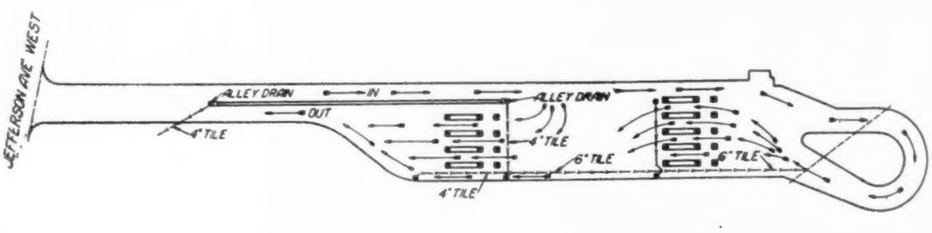
Storage and Packing Plant

The finished cement is conveyed from the finish mill by a screw conveyor, 48 ft. above ground level, and discharges into an elevator at the end of the stockhouse. This elevates the cement up to the monitor above the storage silos where it is discharged to a screw conveyor and conveyed to anyone of the silos or bins.

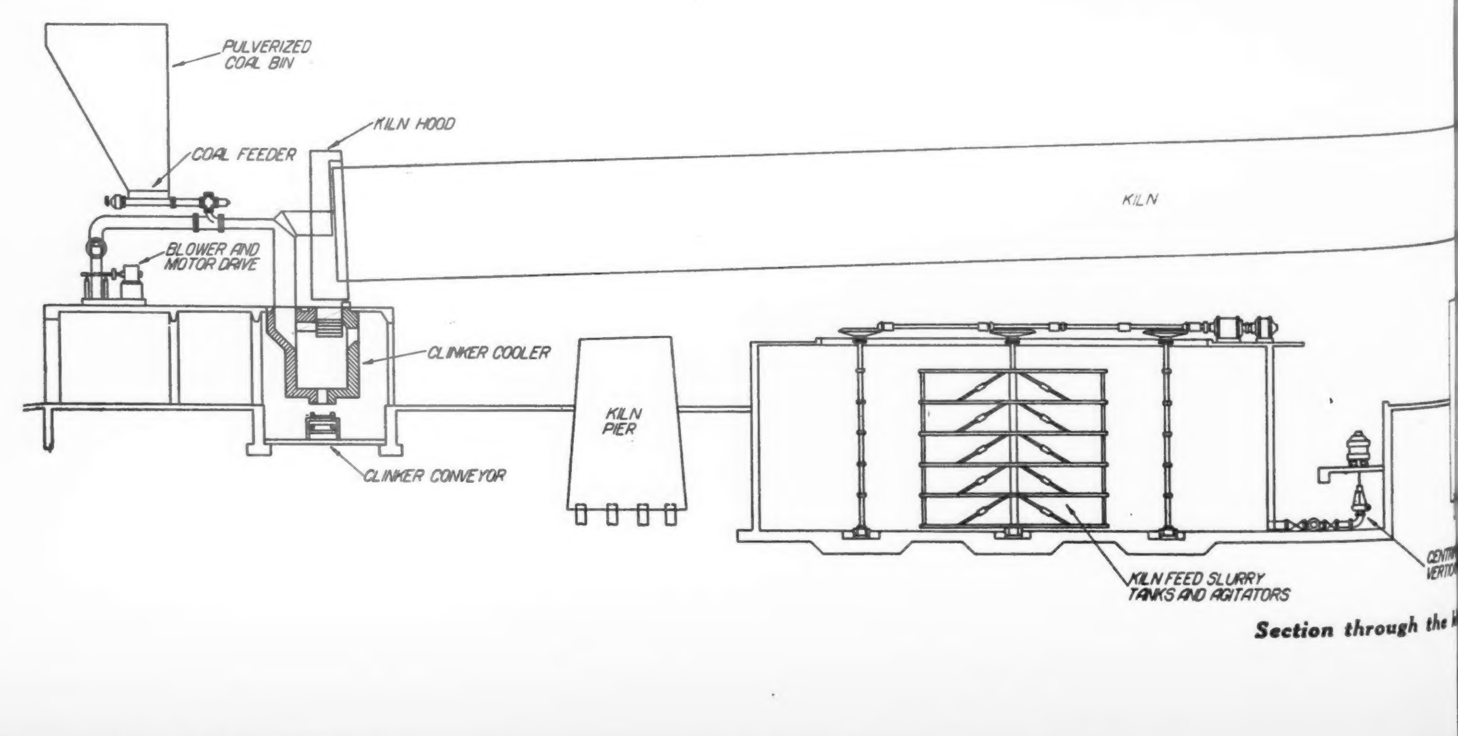
The stockhouse consists of eight silos, 34 ft. inside diameter by 85 ft. high. The total capacity of the silos, with the interspace and pocket bins, is approximately 200,000 bbls.

Below the silos are a number of openings in each bin and these are connected to the screw conveyors by spouts, which have slides for controlling the flow of cement to the conveyors.

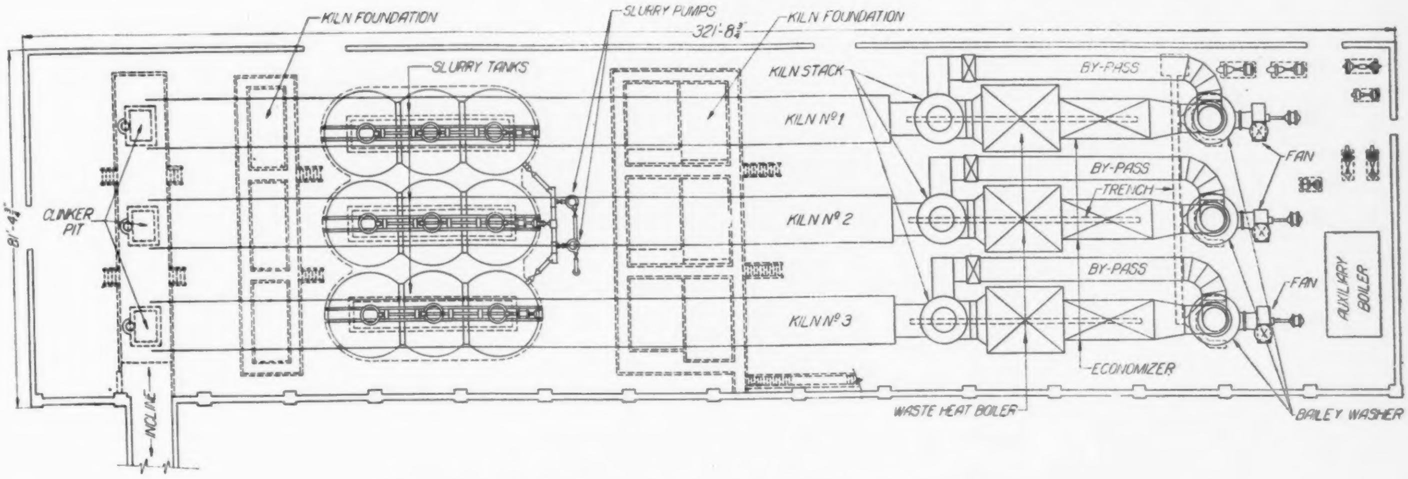
Four lines of 16-in. screw conveyors are located underneath the silos. These conveyors are driven by reversible motors so that the material can be conveyed in either direction. An 18-in. cross conveyor is placed at both ends of the four conveyors, there



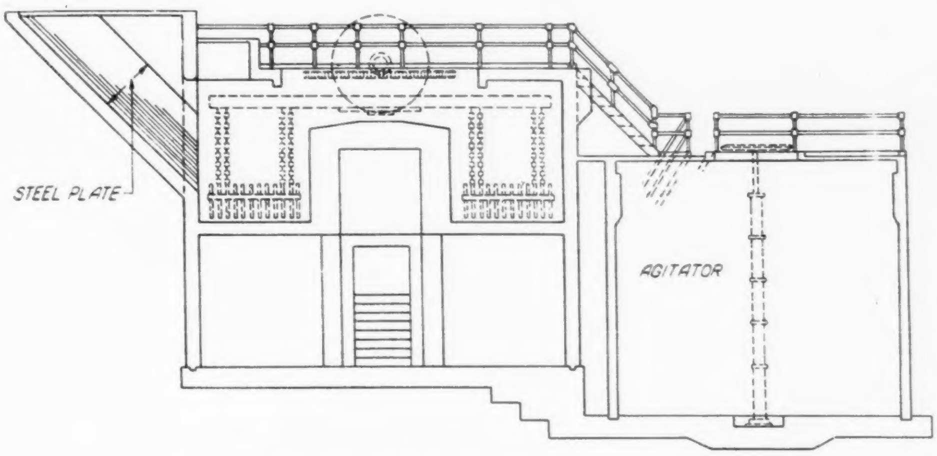
Layout showing yard paving between street and packing plants and direction of travel by motor trucks



Section through the k



Plan of kiln building showing location of all machinery



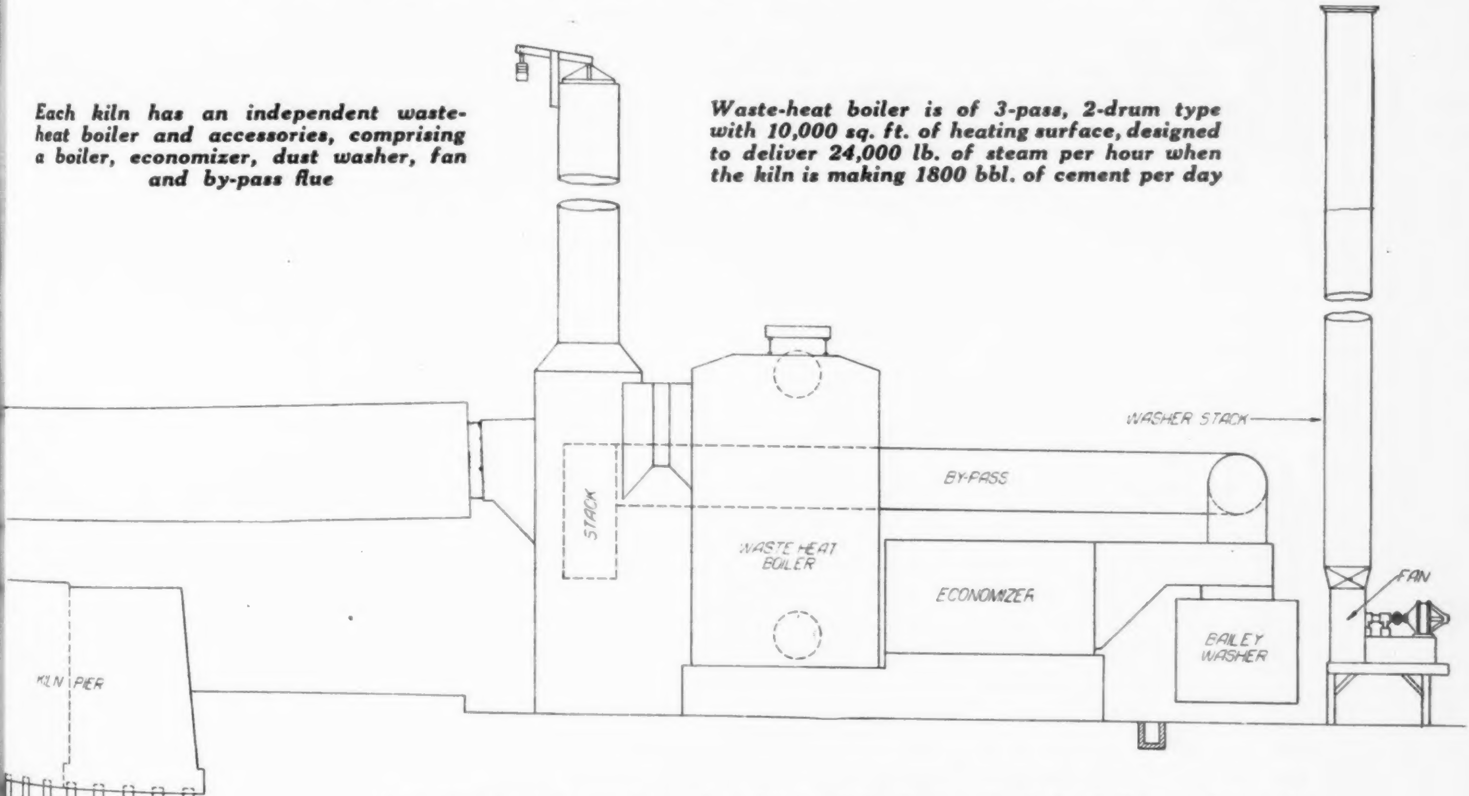
Section through wash mills and clay storage basins

being two rows of conveyors under each row of silos. Individual motors direct-connected to Palmer-Bee speed reducers are installed for each conveyor.

There are two packing houses, one located at the south end of the silos and one at the north end. The one at the south end has four 3-tube Bates valve-bag packers and at the north end three packers. All the packing machines are located on the second floor of the packhouse and each is arranged to discharge to individual belt conveyors, which are piveted and can be raised or lowered for loading motor trucks in the driveway below. The raising and lowering of the belt conveyor is accomplished by a Drake "motohoist," located in the center of each conveyor and operated by push button control.

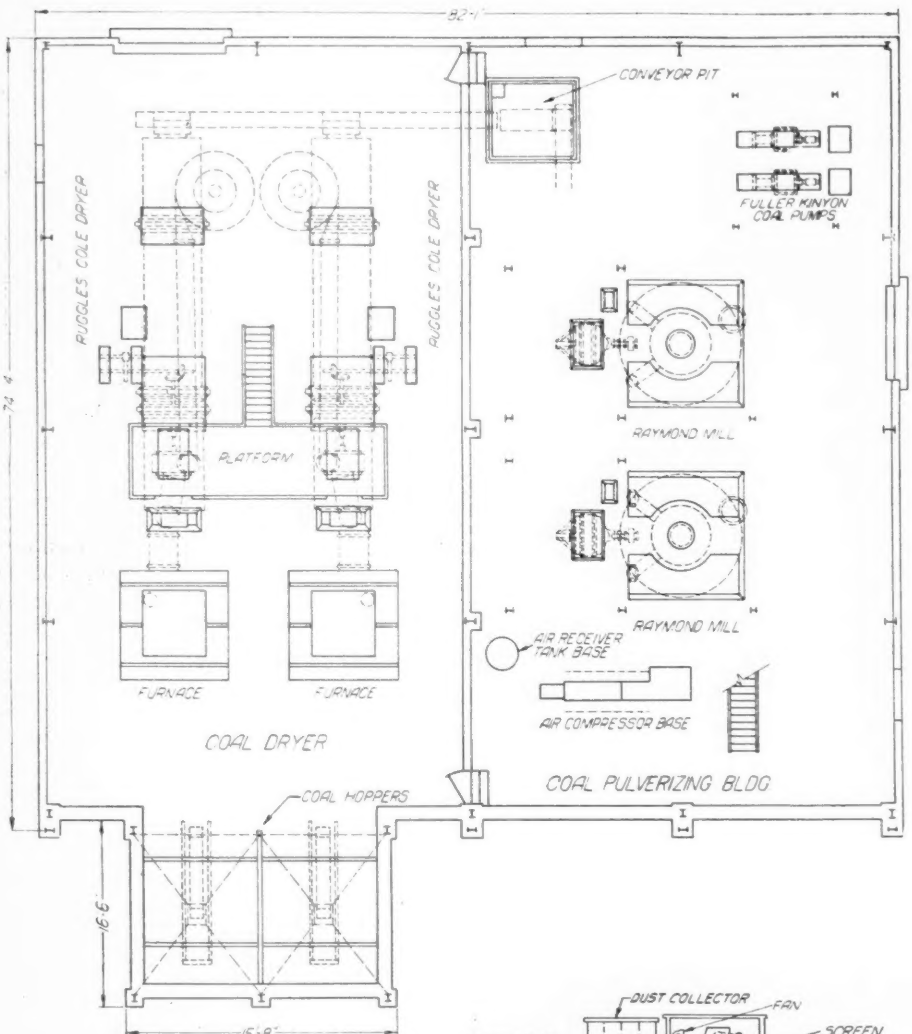
Each kiln has an independent waste-heat boiler and accessories, comprising a boiler, economizer, dust washer, fan and by-pass flue

Waste-heat boiler is of 3-pass, 2-drum type with 10,000 sq. ft. of heating surface, designed to deliver 24,000 lb. of steam per hour when the kiln is making 1800 bbl. of cement per day



The superheaters are located in front of the first pass of the boilers and use the waste heat before it gets to the boilers proper

building and boiler room



Plan of coal dryer and pulverizing building

Loading Seven Trucks at One Time

The arrangement permits the loading of seven trucks at one time. The driveway is so arranged that all trucks enter and leave without conflicting with each other. A 40-bbl. truck is loaded within 15 minutes and this includes the time for entering and leaving the property. Each machine can load 160 bbl. per hour and the whole arrangement permits the loading of 1000 bbl. per hour into motor trucks.

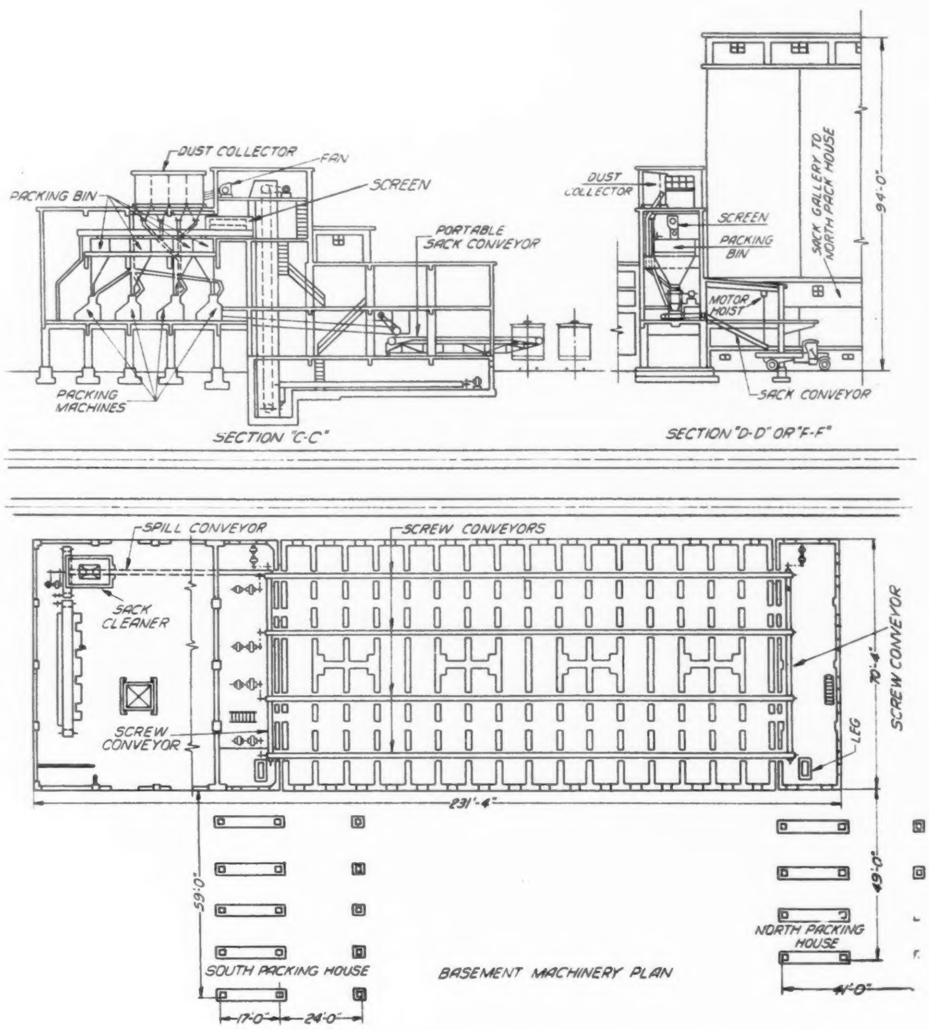
At the south packing house arrangement is made for loading cement direct to railroad cars. The travel of packing machine belt conveyors is reversed, thus bringing the cement to a cross conveyor which in turn discharges into a shuttle conveyor. The shuttle conveyor is on wheels and permits conveying of cement to the second track, thus eliminating all hand trucking.

A belt conveyor is to be installed from the shuttle conveyor to the dock for boat loading, thus permitting shipping by water. The packing arrangement is such that it permits the use of all seven machines for truck loading and four for railroad or boat loading.

At the south end of the silos there is a two-story bag house, 70 ft. square. The machinery for receiving, cleaning and sorting the bags is on the first floor and for tying, repairing and storing on the second. There is a 30-in. belt conveyor, 150 ft. centers, in a conveyor gallery which extends from the south packing house to the north for the purpose of conveying unfilled sacks to the north packhouse. There is a small bag house at this location also, this being a two-story building, 18x70 ft.

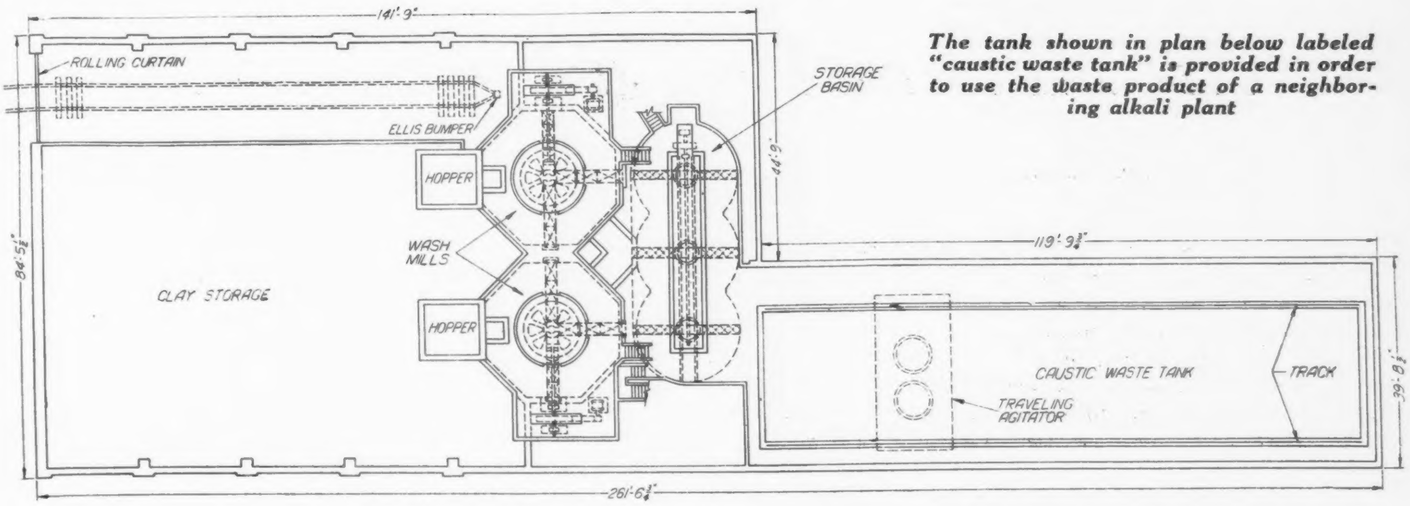
The packhouses are equipped with Sly dust collectors, and these keep the building clean, besides making conditions bearable for the workmen. One Sly collector is located at the bag cleaner and at each packing house on the Bates packers. One of the accompanying photographs show clearly the hood attached to the packer and the pipe from it to the collector.

The stockhouse and packing plants were built under contract by the Macdonald Engineering Co. in accordance with designs and ideas prepared by the Peerless company's engineers. All of the machinery in the stockhouse was furnished by the Webster Manufacturing Co. and all conveyor belts by the Diamond Rubber Co. All speed reducers in the plant were furnished by the Palmer-Bee Co. An Orton and Steinbrenner crawler crane is used for utility work



Plan and section of cement storage and packing plants, showing location of machinery in basement

The tank shown in plan below labeled "caustic waste tank" is provided in order to use the waste product of a neighboring alkali plant



Plan of clay storage building showing wash mill hoppers, wash mill, storage basin and caustic waste tank

and in the yard a 12-ton Whitcomb gasoline locomotive is used for switching purposes and for spotting cars.

Operates on 8-Hour Shifts

The plant is so arranged that no work goes on in any of the departments, excepting the kiln department and power house, on Sundays or holidays. No man works more than six days a week or 10 hours a day. In departments like the kiln room or power house, that are run continuously, the work is arranged in three eight-hour shifts, with relief operators provided so that no man works more than six days a week.

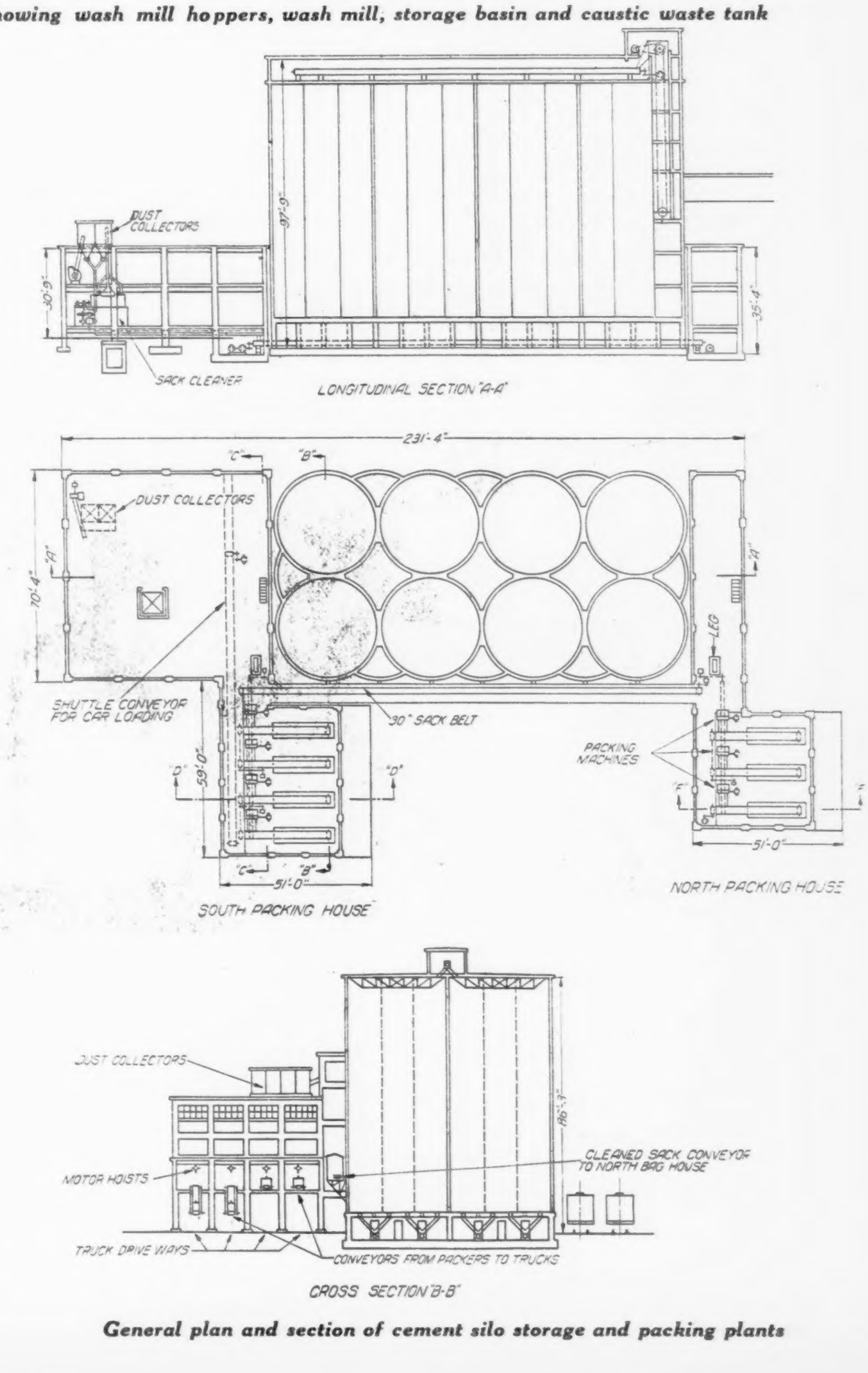
The grinding departments run in two 10-hour shifts on a six-day per week basis. There is sufficient excess capacity to provide raw materials for clinker grinding in the time mentioned. It is the expectation of the management to decrease the working hours to nine hours per shift, as the efficiency of the operation increases.

Due to the large capacity and storage of the clay mill it is possible to prepare sufficient material in the day shift to operate the raw grinding department until the following morning.

The president of the Peerless Portland Cement Co. is William M. Hatch; vice-president, Chas S. Bush; secretary and treasurer, John Gillespie. The plant was designed by A. F. Miller, consulting engineer, who was also in charge of construction. Mr. Miller has been closely identified with the cement industry for over 18 years. In late years he has acted as consulting engineer for various companies throughout the country. The designs, arrangement and construction of the new plant were entirely under Mr. Miller's jurisdiction.

Chas. M Loveland is general superintendent at the plant and John Lundteigen, chief chemist.

The Peerless Portland Cement Co. is one of the oldest cement manufacturing concerns in the country. It has operated a plant at Union City, Mich., since 1897.



General plan and section of cement silo storage and packing plants

An Efficient Dredging Operation

Well Designed Dredge and Simple but Effective Screening Plants

THE Atlas Sand and Gravel Co. of Indianapolis, Ind., has the reputation among the producers of that city of having the lowest production cost in the district. Without inquiring into the matter, the observations of the Rock Products representative would seem to bear this out, for on the day that the plant was visited one man was visible on the dredge and one at the washing plant and the assistant secretary was alone in the office. Yet production was going on steadily and the sand and gravel were piling up in the bins as fast as though a dozen men had been employed about the place.

The Alas plant is a "straight" dredging plant; that is, it pumps the material directly to the screens, without repumping or using a dragline to re-excavate it. That is, it does this normally. Sometimes in the winter season it pumps the material to a part of the pond below a dragline plant and in the summer runs both plants to keep up with the peak demand of the season, the dragline excavating the stored material.

The dredge is one of the best designed and built dredges in the district. Hull and cabin are wholly of steel. The pump is a 10-in. American Manganese Steel Co.'s pump, especially designed for dredging work, and it is direct-connected to a 250 h.p. variable speed Fairbanks-Morse motor. An unusual feature of this electrical equipment is that high-tension cables are carried out to the dredge, the transformers being at the stern. The dredge is provided with a Swintek traveling suction screen to protect the suction. This has a 15 h.p. Fairbanks-Morse motor direct-connected. For handling the lines and the suction there is a three-drum Thomas hoist powered with a 15 h.p. Wagner motor.

The engineering for the pump unit and accessories was done by Bradley Carr of the American Manganese Steel Co. The hull was built by the Indianapolis Tank and Boiler Co.

The dredge has a steel hull and cabin. The two plants are shown on the bank at the rear

The dredge pump is primed by a Penberthy injector which sucks the air from the suction pipe. This injector is operated by water in the place of steam, the water being furnished by a 3-in. centrifugal pump running at 1500 r.p.m.

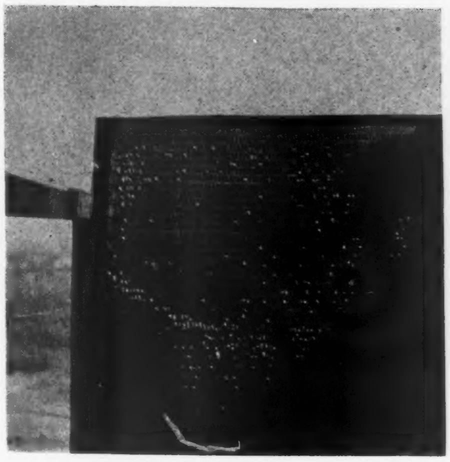
The pipe line to the shore is of welded steel weighing 35 lb. to the foot connected by Dayton pipe couplers. The pipe is not threaded. The ends are slipped inside the ring of the coupler and held there by rubber rings which have a conical face that wedges against conical faces on the sleeve. The

whole is drawn tight by means of bolts connecting the ends.

The line is carried on cylindrical steel pontoons placed somewhat nearer than is the usual practice. These pontoons also carry the frames on which the electric cables are strung.

The dredge is well lighted and has a searchlight so that work can go on at night when this is necessary.

The washing plant is a simple gravity screening plant. The pump discharge enters a box and strikes against a grating of angle irons and then falls to a series of gravity screens set parallel and at about 30 deg. inclination. All screens are slotted. A number of sizes are kept on hand and screens are quickly changed according to the material that is wanted. The day the plant was visited a 2x3-in. slot, a ¼x1-in. slot and a 1/12x1-in. slot screens were being used, the product of the finest screen being for brick work, tile setting and some forms of plaster work. There is a considerable demand for sand of this kind in Indianapolis. Concrete sand when it is made is settled in a plain hopper below the screens and the overflow is sent to waste. The fine sand is settled in a steel bin.

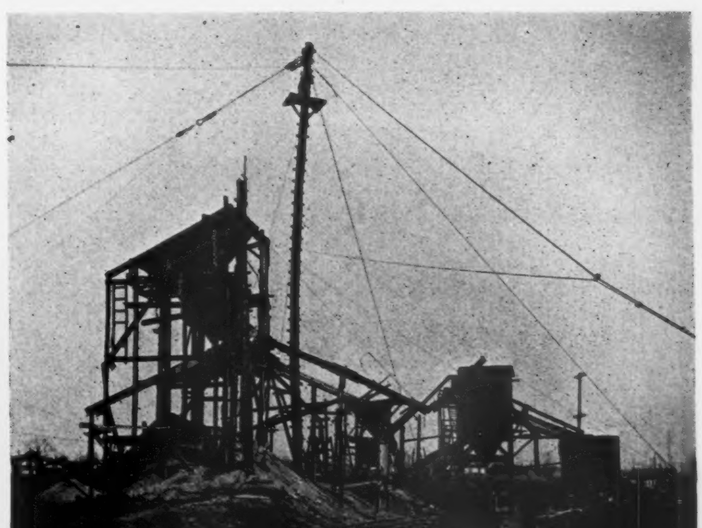


Slotted screens are used

There is a set of these steel bins set beside the plant so that either railroad cars or trucks may be loaded from them. They were made by Hetherington and Bauer of Indianapolis.

During the past winter the plant had to be run in the coldest weather to keep up

This shows the area of the pond and the two plants and steel bins



The plant on the left receives the pump discharge through the pipe shown. That on the right employs a dragline to recover the material pumped to storage by the dredge

The coarse screen

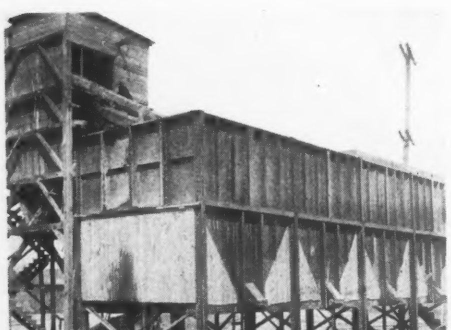
with two concrete bridge jobs for which it was furnishing aggregate. Ice had to be cut almost every day from Christmas to the middle of February to keep up with the work. The bins were heated with salamanders to keep the sand and gravel from freezing.

The office of the Atlas Sand and Gravel Co. is at 1703 Minnesota street, Indianapolis. O. T. Owen is president, general manager and treasurer. Henry Harmon is secretary and W. B. Owen is assistant secretary.

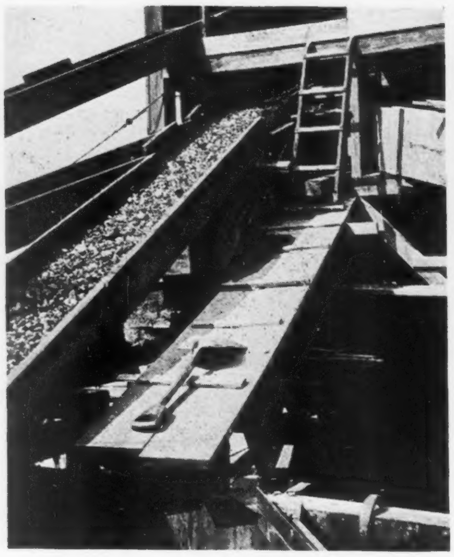
Smaller 1924 Exports of Austrian Magnesite

(Assistant Trade Commissioner Ellwood A. Welden, Vienna)

THE exportation of magnesite from Austria in 1924 amounted to only about one-third of the normal amounts shipped. Exports of crude magnesite totaled 1633 metric tons as against 2249 in 1923. Practically all went to Great Britain and Germany. Exports of dead burned magnesite in 1924 amounted to 73,921 metric tons as compared with 84,782 during the preceding year. Notwithstanding the high import duty into the United States, this country consumed 43,171 metric tons, as against 45,544 in 1923. Germany followed with a consumption of 9862 tons, compared with 10,077 in the preceding year; France, 6898, increasing from 6765 tons in 1923; England, 5159 tons, a decline from 13,057; Czechoslovakia, 2156, a slight change from 2183 tons; Italy, 1326, increasing from 1079; and Spain, 1281, an advance from 691 tons in 1923. Shipments also went to Poland, Yugoslavia, Switzerland, Peru, India, Argentina, Chile, Mexico, and Australia.—*U. S. Commerce Reports.*



Salamanders were placed in the boarded-in spaces for heating aggregate



Gravel chute to steel bin

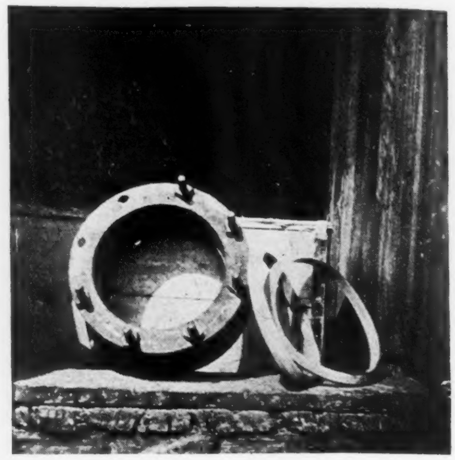
Upper part of steel bins

New Safety Service Division of Bureau of Mines

AN extension of the work of the Bureau of Mines for greater safety in mining operations is the purpose of a new sub-division of the Safety Service of the Bureau, which began to function July 1, coincidentally with the transfer of the Bureau to the Department of Commerce from the Department of the Interior, according to an announcement by Dr. D. A. Lyon, acting director.

J. J. Forbes, who has served as district engineer in Alabama, has been designated as the chief of the new sub-division, which will be known as the Safety Extension Service. The new sub-division, with the Mine Safety Service, which, under D. J. Parker as chief engineer, has performed notable rescue work at numerous mine disasters and trained thousands of miners in mine rescue and first aid methods, will make up the Safety Service of the Bureau, under Dr. T. T. Read, safety service director.

About half the deaths in coal mining result from falls of roof or coal, Dr. Lyon points out, while in metal mining approximately one-third of the deaths result from similar causes. Efforts to bring about a reduction in the number of these fatalities have not so far shown substantial results in the United States. Since the individual miner is the one who can do most to exercise precautions against the hazard from falls of coal or rock, one of the principal duties of the new Safety Extension Service will be to perform such educational work in mining communities as should influence the miner to take greater precautions against such accidents.



Type of coupling used

Green Sands of Jersey Furnish New Potash Supply

A THOUSAND years' supply of potash for the American farmer, independence in the future from European supplies and the establishment of a new great industry in the United States are all possible as a result of a new process for making potassium sulphate from the great quantities of green sand found in New Jersey, Delaware and Maryland, Dr. J. W. Turrentine, C. W. Whittaker and E. J. Fox, soil chemists of the U. S. Bureau of Soils, told the American Chemical Society, meeting at Los Angeles.

The process has been made economically possible by the manufacture of valuable materials such as alum, alumina, ochers and glaucosil, a new earthy absorbent, as by-products. The new process is being demonstrated in the laboratories of the Electro Company at Odessa, Del. The method consists in extracting the raw material with sulphuric acid. The green sand deposits, which are practically at the surface, can be worked with steam shovels.—*Boston (Mass.) Transcript.*

Massillon Sand, Gravel Plant Remodeled

New Equipment and Changes in Design Doubles the Output of the Massillon Washed Sand and Gravel Co., Navarre, Ohio

By George M. Earnshaw
Central Representative, Rock Products

WHEN conditions demand an increase in production in excess of a plant's capacity, some operators enlarge their plants in the shortest time possible, with little regard to the quality of construction and equipment. The result in such cases is a "slap-stick" plant requiring a corps of mechanics and carpenters for the rest of the season to keep it running.

From 1500 to 3000 Tons Per Day

Such was not the case with the Massillon Washed Sand and Gravel Co., however, for when it was found that the plant's capacity had to be increased, they set out to do it right, and they did. The plant as a whole at this writing has only a capacity of 1500 tons per day, but upon completion of installation of three additional conical screens and two cone settling tanks, it will be able to turn out double that amount. This is possible because the major equipment originally installed, (including dragline, hopper, conveyors, crushers and scalping screen) was big enough for the increased tonnage in the first place.

The plant is at Navarre, which is about 4½ miles south of Massillon, Ohio, on the Wheeling & Lake Erie railroad. Practically all of the material is shipped by rail. The company owns 40 acres, all of which is sand and gravel, running about half and half gravel. It has an overburden averaging 10 ft. which is removed by a ¾-yd. revolving steam shovel. Incidentally, this shovel is the second manufactured by Russell & Co., of Massillon, Ohio. The dirt is hauled to the dump in trains of two 4-yd. Western cars each, by a 16-ton Plymouth gasoline locomotive.

Excavation Methods

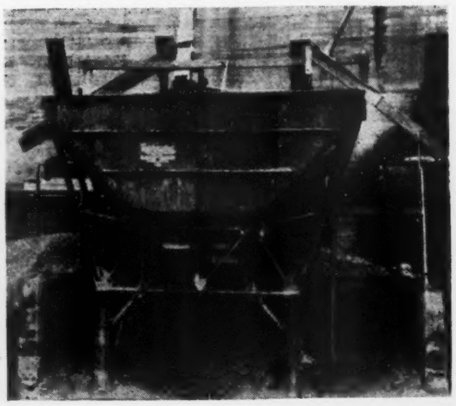
The dragline is a Sauerman with a 4-yd. bucket, operated by a Thomas hoist. The hoist is powered by a 150-h.p. variable speed motor through Link-Belt silent chain drive. The hoist and the plant throughout are equipped with G.-E. motors. This part of the plant is new this year. The hoist and hopper have been moved from the edge of the pit to the center and connected to the plant by belt conveyor. The bucket comes in at any angle and empties into an 8x10-ft. concrete hopper which is provided with a grating of rails spaced about 12 in. apart.

A 30-in. belt (Goodrich) of 200 ft. centers, driven by a 40-h.p. motor and mounted on Jeffrey idlers spaced 4 ft. apart, carries the run-of-bank material up an incline of about 18 deg. and empties directly into a 48-in. x 16-ft. revolving screen driven by a 20 h.p. motor. The first three sections of this screen have 1¾-in. perforations and the fourth section has 4-in. rings. Rejections are chuted to an 18x24-in. Worthington jaw crusher which discharges on a 30-in. belt conveyor of 100 ft. centers. This conveyor replaces an old 18-in. x 25-ft. belt-bucket elevator which was the course of much grief in previous seasons. It discharges to the main conveyor running from the hopper to scalping screen.

Operation of the Massillon Washed Sand and Gravel Co. showing the receiving hopper, the house for the scalping screen and crusher, and, at the right, the plant conveyor and the washing plant

The 4-yd. scraper bucket coming in with a full load

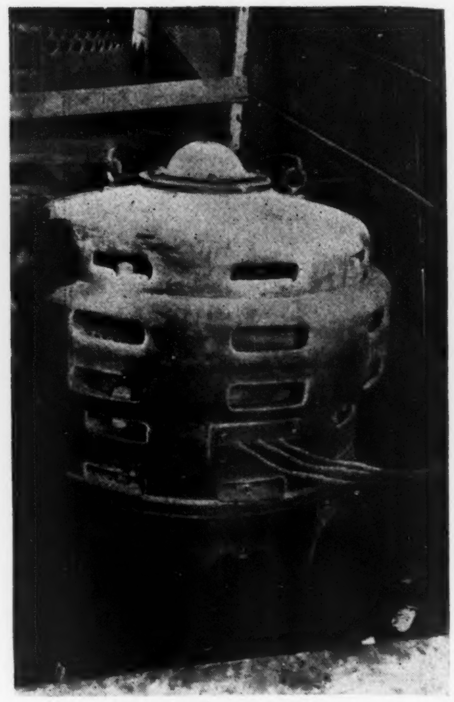
Gravel passing through the 4-in. section drops almost directly into a Weston direct-drive gyratory crusher set to discharge at



The 112-ton batcher which is a great advantage to deliveries by truck

1¾-in. The product of the 1¾-in. sections of the scalper, together with the product of the Weston crusher, is received an another 30-in. conveyor of 167-ft. centers, mounted on Link-Belt idlers. This belt also operates up a stiff incline with a heavy load and is driven by a 40-h.p. motor. It empties into a 5x8-ft. steel hopper into which a 6-in. water line discharges, starting the material on its way to the scrubber.

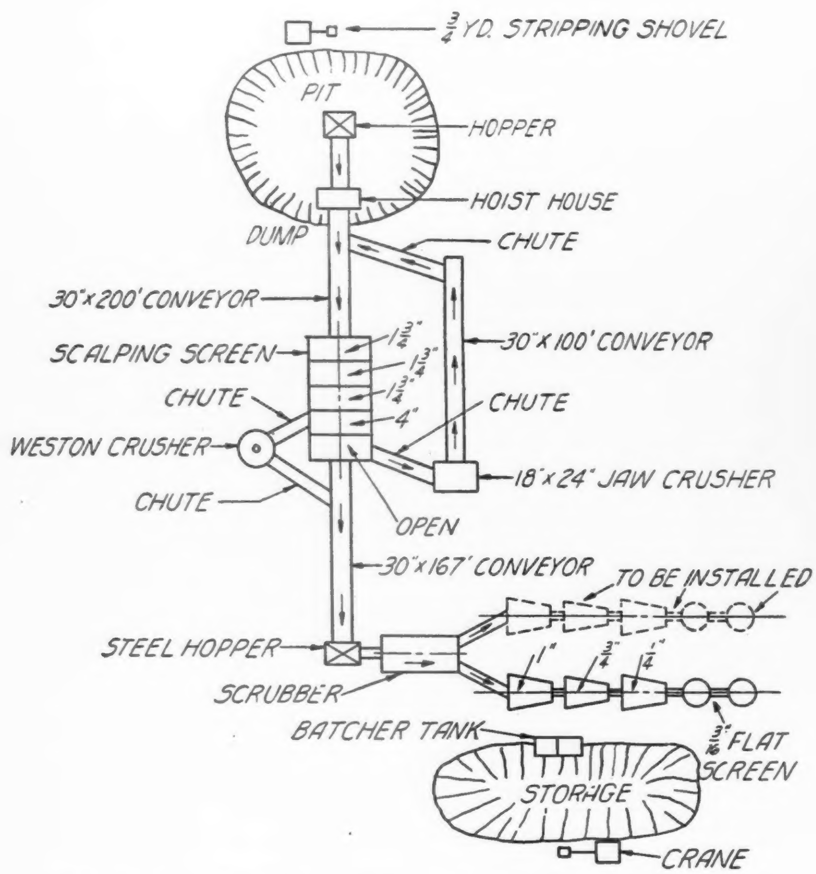
The scrubber is of standard Link-Belt design and is, together with three conical screens, driven by a 25-h.p. motor. The first screen has 1-in. perforations; the second ¾-in. and the third ¼-in. The products of the screens are chuted to their respective



Motor of direct-drive secondary crusher

concrete bins directly underneath. The fines are flumed to two Link-Belt cone tanks. Mason sand is obtained by a 3/16-in. gravity screen placed in the flume between the two cone tanks.

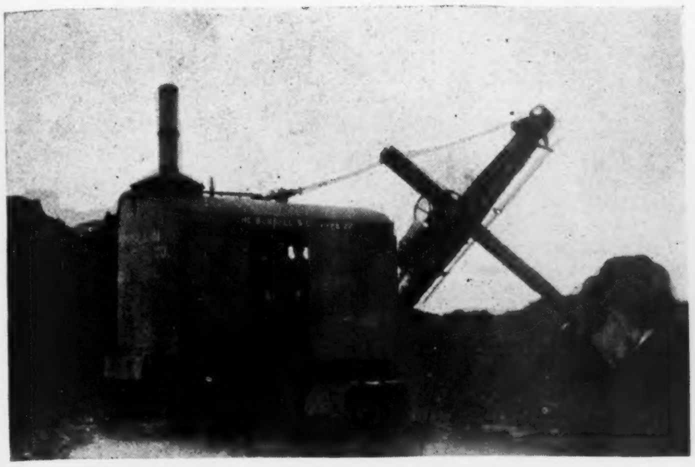
Two long chutes, one for sand and one for

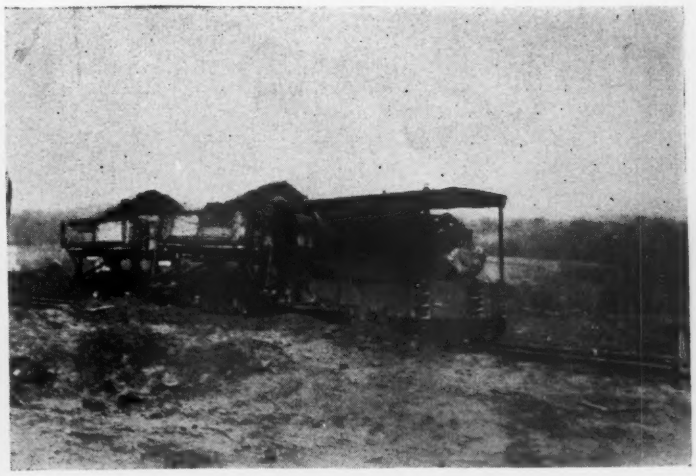


This sketch (not to scale) shows the layout of the entire operation from the gravel pit to the storage pile

The 30-in. conveyor that brings the undersize of the scalping screen to the washing plant

gravel, which can be connected to the spout of any bin, afford a means of outside storage, accommodating several thousand tons. These chutes also serve in keeping filled a 112-ton capacity Blaw Knox batcher tank for the accommodation of the trucking trade. The sand and gravel is rehandled in storage by a Browning crane on crawler treads, equipped with a ⅞-yd. orange-peel bucket.





Overburden is dug by the shovel shown and removed in cars drawn by a "gas" locomotive. About 500 yd. of stripping is handled daily

L. L. White is superintendent in charge of the stripping and A. Fishel is superintendent in charge of the rest of the operation. K. K. Kutz, son of the company's president, is general manager and is in charge of sales. William F. Kutz is president; H. L. McClain is vice-president; Charles Swanson, chairman of the board and O. D. Miller, secretary and treasurer. The main offices of the company are at 518-19 First National Bank building, Massillon, Ohio.

Rogers Hits Use of Inferior Rock Products in Building Practice; Educational Campaign Needed

THE *Los Angeles (Calif.) Examiner* of August 16, 1925, contains the following article given out by George A. Rogers, president of the Union Rock Co. of Los Angeles, Calif.

An educational campaign for the use of clean washed sand and rock products in the building and construction trades has been sponsored by the Union Rock Co. for many years, according to George A. Rogers, president of the company, in an interview recently. This campaign has not been directed at competition, but at a harmful and dangerous practice which is costing the home owner money and will continue to incur greater expenses as the buildings grow older and the weakness of construction comes to light.

There is little excuse for any but the best materials in these lines, for there is a plentiful source of supply, and the cost of clean washed materials is practically the same as that of unsuitable substitutes which are sold at a price just a little under that of the better grades. Southern California has large deposits of the best grades of gravel, sand and rock.

"Of course, it takes proper equipment to wash, grade and market these materials. For example, the water supply for the Union Rock Co. is large enough to take care of a city of 50,000 population. We employ modern handling equipment and experienced operators in order that any man who wants good materials can be supplied promptly and economically.

"Public opinion at present is keenly interested in the preservation and safety of dwellings in Southern California. Experts who have visited Santa Barbara present their opinions as to the most important causes of the heavy damage caused by the recent tremor.

Lesson in Tremor

"A prominent witness made the statement that no modern steel frame or reinforced building was injured, the destruction being confined to the old style brick buildings and concrete without reinforcement."

Added to this is a statement by Prof. Bailey Willis of Stanford University, who said that there would have been little damage and the earthquake would have passed simply as an interesting experience if public opinion had supported the officials in a rigid enforcement of the rules of good construction.

George A. Rogers

Harry Lee Martin, an officer of the Mortgage Guarantee Co. of Los Angeles, said: "Before making loans to persons who are building homes, our officials have always studied plans and specifications and exerted their influence to make people build with better materials."

"It was with regret that we viewed the large amount of building which was done with poor materials and poor workmanship, when a difference of less than 1% of the cost would have bought first-class construction. Los Angeles has a good building code, but it could be made much better and the standard of home building could be raised without imposing unnecessary hardship on the owner.

Good Mortar Vital

"For one thing, lime mortar should be replaced by cement-mortar for laying bricks, if you expect walls that will survive years of service. Good sand should be used. Not a mixture of dirt and sand, but clean washed sand which adds strength to the mixture.

"Where gravel or crushed rock is specified for concrete, it should pass a 35 rattler test, so that the finished concrete may have the solidity and strength to carry the load placed upon it."

John C. Austin, architect, declares that he will never permit anything but clean, washed sand, rock and gravel to be used on any job for which he is responsible.

"When unwashed, dirty sand is used, the architect has not the slightest idea of the strength of the resulting material," Mr. Austin said. "It may stand up for a time, or it may crumble away under the mere weight of the laborers who are working on the building.

"The use of unwashed, untested materials for buildings is one of the most wasteful and costly practices today. Owners should be posted on the risk attached to it, and should see that they get good materials."

Marblehead Lime Company to Build Big Rotary-Kiln Plant at Chicago

Progress Rapid Since Present Management Took Hold

REALIZING the great development taking place in the Chicago industrial district, the Marblehead Lime Co. has decided to build a lime plant in that district and has purchased a piece of property at 103rd Street and the Calumet River, in what is known as South Chicago. Here a modern lime plant will be erected, embodying all the good points of improved methods of lime production. The rock for this plant will be furnished by the Michigan Limestone and Chemical Co. of Calcite, Mich. This company is the largest producer of crushed limestone in the world and their vast plants at Calcite have facilities for producing 8,000,000 tons of crushed rock a year. This limestone deposit is one of the purest high calcium stones in the country and has found a ready market in the steel industry, where it is used for flux.

The stone will be brought to Chicago in self-unloader boats in cargoes of 12,000 to 14,000 tons each. It will be unloaded directly on the docks of the Marblehead Lime Co. and from the storage pile reclaimed by electric shovel and quarry cars and conveyed to the plant.

The initial installation will consist of two 9-ft. by 175 ft. rotary kilns. For the first operation oil will be used for fuel, but the plant is designed so that gas producers can be installed at any time. After the lime is taken from the rotaries and cooled it will be elevated to storage tanks of which there will be three of 500 tons capacity each, and from here it will then be loaded directly into cars or into barrels, with provision for loading auto trucks to take care of the local trade. The storage tanks will also supply the lime to the hydrating department. The lime will be elevated to a bin, flowing by gravity into a Kritzer hydrator. After passing this machine it will be conveyed to a Raymond pulverizer and through a Raymond air-separating system. The finished product will be discharged direct into three bins of 350 tons capacity each. Under each one of these bins there will be a Bates packer to fill the valve bags.

A History of the Marblehead Lime Company

The Marblehead Lime Company was really established in 1874 by A. T. Howe, who with an associate began the distribution of Wisconsin-made lime. This was the reconstruction period after Chicago's great fire. In 1883 the business thus established was incorporated under the name of the Marblehead Lime Co. and the lime distributed came from Marblehead, Ohio—the first "hot" lime used in the Chicago territory. Afterwards the company built a lime plant of its own at Marblehead, Ill., and another at Marblehead, Wis. The latter plant was subsequently sold to the Union Lime Co. of Milwaukee and is now one of the units of the Western Lime and Cement Co.

The Marblehead company confined its activities to the high calcium lime business and from time to time it has acquired and developed limestone properties in Illinois and Missouri until it has now become the largest high calcium lime manufacturer west of Pittsburgh. The company maintains its executive offices at 160 North La Salle Street, Chicago, and has branch sales offices in Hannibal, Mo., and Kansas City, Mo.

It was the first company to build a hydrated lime plant west of the Mississippi River. It also enjoys the reputation of being the first lime concern to develop its quarries by tunneling and mining rock so that it virtually is one of the pioneers in the advancement and development of new manufacturing processes and in extension of markets. The men who direct the company have great faith in the possibilities of lime as a chemical, and have devoted their efforts to produce such a material.

Present Operations

Plant No. 1 is located at Marblehead, Ill., about 10 miles below the city of Quincy, Ill., on the Chicago, Burlington & Quincy and Wabash railways. At this location the company owns a large area of land underlaid with the Burlington limestone, a remarkably pure and uniform material. The quarry is about a mile from the plant, and the ledge of rock varies from 25 to 35 ft. in thickness. Two methods of quarrying employed—tunneling and open-cut. Some years ago, after the tunnels were driven, it was found that the overburden on the north end of the ledge was very light so this was stripped and rock which had been left as pillars and roof for the tunnels is reclaimed. The two workings allow tunnel operations on stormy and bad days without interruption, while during good weather the outside work can be carried on to advantage.

A well laid out plan of large room areas, with sufficient natural stone left to form a pillar and support the roof is the system of mining. The drilling is all done with Denver air drills, which have been found to be satisfactory and efficient for this method of driving horizontal holes. The system used now in opening up a room is first to drive a wedge shot, which removes the pressure on the mass or body of stone, and this is followed by slabbing to extend the area of the room. This is found to be the most economical system and reduces to a minimum the number of spalls made. It is the object of the company to send as much of the output of the quarry to the plant as it is possible. The rock is loaded by hand into V-shaped quarry cars carrying approximately 2½ to 3 tons. It is hauled to the lime plant in trains of four or five cars each by a Davenport locomotive. When delivered to the lime plant the cars are hoisted to the top of the kilns, which are eight in number.

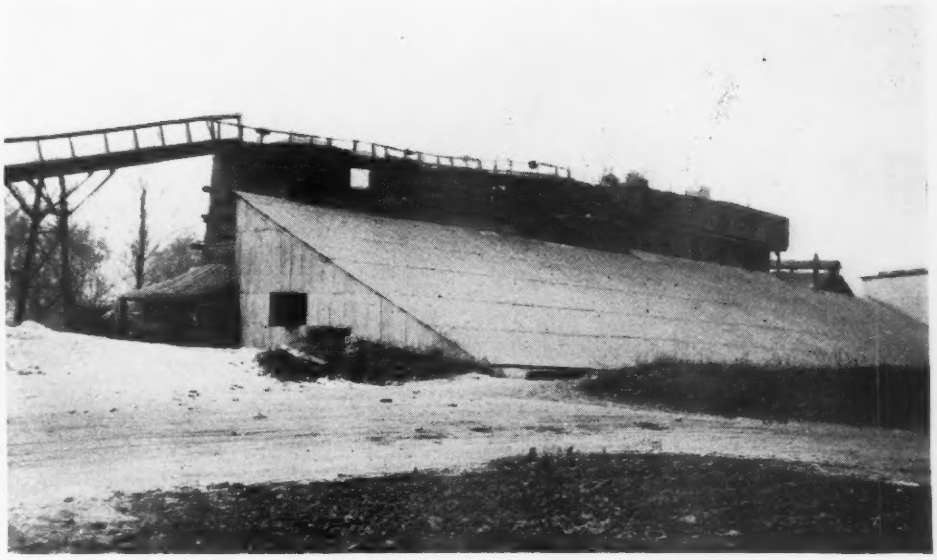
There are three stone kilns of the old type, fired with coal, and five modern steel shell kilns fired by a gas producer. A study of the gas-producer operation extending over a considerable length of time has greatly increased the efficiency of these kilns and improved the quality of the lime produced.

Gas Producer Uses CO_2 Instead of Steam

After experimenting for over two years an installation was made to reclaim the carbon dioxide from one kiln and by pressure introduce this gas under the producer in place of steam used for blowing. This was found to be practical and an improvement was noticed, not only in the operation of the producer but in the quality of the gas and its performance in the kiln. Steps were then taken to make a permanent installation of substantial materials to tie in with the other equipment. The gas-making equipment consists of two 10-ft. producers, one of which has been equipped with a Chapman agitator, which automatically feeds the coal and keeps a uniform depth of fire. This Chapman agitator has made it possible for the one producer to furnish as much gas as the two producers did formerly.

and at the same time give a better quality gas of more uniform flow.

After the lime is drawn from the kilns and allowed to cool on the floor it is loaded in bulk into the cars, or in barrels for that trade which requires lime in packages. The remainder is sent to the hydrating department. The first step is to reduce it in the Sturtevant mill and elevate the crushed lime to a storage bin by gravity, from which it flows to a Kritzer hydrator, passing through this continuous system into a Raymond pulverizer. The fan passes this material to a cyclone collector and the finished product is then stored in concrete bins, under which a Bates packer bags the finished hydrated lime.



The Marblehead, Illinois, plant of the Marblehead Lime Co.

Scientifically Controlled Operation

Through all these steps from quarrying the rock to the lime in the car, either in bulk or in packages, an accurate control check is kept. Before quarrying the rock the samples of the ledges are taken so that the chemist in charge knows the raw materials being sent to the kilns. With the necessary equipment on the gas producer and in the kilns to gauge the heat and take samples of the gas, a control is held over the calcination to see that it is carefully burned and not subject to overheating. While the lime is on the cooling floor an inspector carefully goes over it, and any pieces that might indicate unsatisfactory quality are thrown to one side. In the manufacture of the hydrated lime frequent samples are taken and tests made for moisture content as well as for fineness. A standard is set for these requirements and the finished product must pass the chemist's requirements before it is allowed to go out to the customer. Chemical control has been a decided advantage to the company for it standardizes production and minimizes complaints.

Mining limestone at the Quincy, Illinois, quarry

Battery of old stone kilns at Quincy, Illinois

In many manufacturing processes formulas are established, and lime as a base materially affects successful operation. Therefore it is necessary to have a uniform lime that the action of the other elements may not be upset. The same care and supervision is given in all of the Marblehead plants, and while there is some deviation from the character of the rock in each of the quarries, the same supervision is maintained at each plant.

It has been the object of this company to study the needs of the user and to determine which limestone makes the best lime for the particular purpose required. As an illustration of this a large chemical user experimented with lime from each of the company's plants and it was found that by changing the burning system at one of the plants that lime was better suited than any other product this concern had ever used. This required a hard-burned lime, and on account of the other elements entering into the basic material the chemical reaction which took place was especially beneficial in the ultimate finished product.

Quincy Plant

Plant No. 2 is located about two miles south of the city limits of Quincy, Ill., on the Chicago, Burlington & Quincy and Wabash railways. The formation of rock here is a continuation of the bluffs along the Mississippi River, though at this point is about a mile east of the river itself. It consists of Keokuk and Burlington limestone; the latter is the one worked. This plant is one of the oldest in the state of Illinois and originally was known as the Quincy White Lime Co. It consists of four square stone kilns, which are fired with coal obtained from the central Illinois fields. At this quarry both open-cut work and tunnel mining are used.

Recently it was found that the floor of the tunnel could be taken out and the face of the rock has been extended to a depth of 8 ft. The same general method of opening up of rooms is followed as at the Marblehead plant, and the rock is hauled to the foot of the incline in V-shaped cars by horses.

A new Gardner single-stage air compressor to furnish the air used in the quarry operations has recently been installed.

Quincy white lime has long enjoyed an

Panorama of the Springfield, Missouri quarry

enviable reputation among dealers in builders' supplies and there is a great demand from that class of trade. Many of the oldest dealers in Illinois have distributed this lime for 25 or 30 years.

The power for this plant as well as Marblehead is furnished by the Mississippi River Power Co., whose hydro-electric station is located at Keokuk, Iowa.

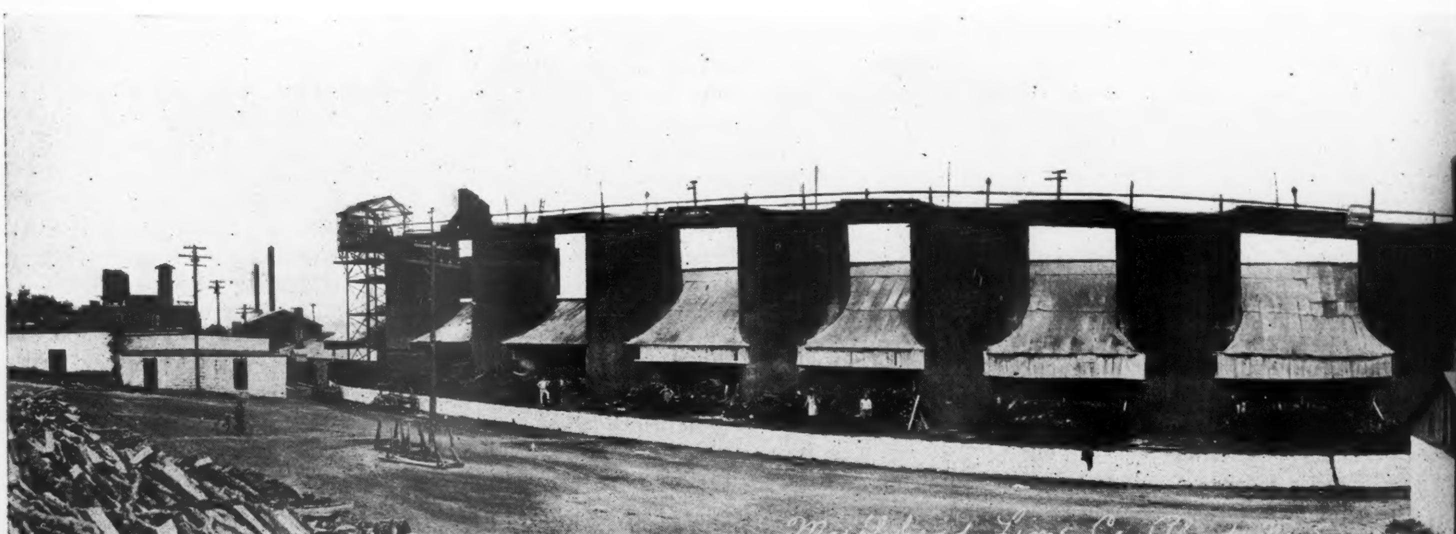
Spalls from the quarry are sent to the crushed stone plant, a small unit for disposing of waste material, which can not be used for any other purpose. A ready market is found for this material in sized stone, which is used for street and road paving, while the screenings or finer materials are used for agricultural purposes. As a large quantity of lime is sent out in barrels, the company maintains a cooperage plant.

Hannibal Plant

Plant No. 3 is the original Hannibal Lime Co., which was in the control of the Marblehead owners for many years, but not taken over until about three years ago as one of the Marblehead units. This plant was originally established by the Munger brothers and is one of the oldest lime plants west of the Mississippi river. In 1905 the company put in the first Kritzer hydrator that had ever been built, and this was in successful operation until the plant was destroyed by fire in 1910. The entire unit was then rebuilt of fireproof construction and continued very successfully as this hydrated lime became well and favorably known to the trade.

One of the special fields for which the Hannibal product was found to be especially adapted is that of water purification. On account of its quick-settling properties this hydrated lime is in demand where large volumes of water are purified, as for municipal water-works.

The Hannibal quarry is on the side of a hill and a tramway runs to the top of the kilns, which are located in a ravine between two hills. This plant is on the St. Louis and Hannibal railway, but has direct connections in the city of Hannibal with the Chicago, Burlington and Quincy and Wabash railways. This plant consists of five kilns and practically all of this product is sent out as hydrated lime. It was at this quarry that the first effort was made to tunnel or mine for rock. At the present time the quarry floor is nearly 200 ft. above the track level and the ledge of rock varies from 18 to 25 ft. in thickness. Below this quarry floor is a layer of stone some 6 ft. in thickness, under which is another ledge of white limestone which runs very high in calcium and is well suited for the particular lime the company makes. Ef-



Panorama of the lime plant of Marblehead Lime Co. at Springfield, Missouri

quarry of the Marblehead Lime Co. of Chicago

forts are now being made to develop this ledge so that the quarry will be brought in on a lower level.

As in the other tunnel operations, Denver air drills are used and the rock loaded on cars and hauled to the mouth of the tunnel by Whitcomb gasoline locomotives. A Gardner two-stage air compressor furnishes all the air required in the driving operations. From the mouth of the tunnel the cars are dropped by gravity to the top of the kilns. At this plant two kilns have been equipped with oil-burning apparatus, and various kinds of equipment have been used. It has been found that the capacity of the kiln is kept up and the fuel cost is no greater than in using Illinois coal.

While the company has not finished with the experiments, they have gone far enough to indicate that oil burning in the vertical kilns is a feasible and practical operation, but the application and type of the oil burner is something which will have to be worked out with a specially designed kiln. Two of these kilns are using southern Illinois coal with good results.

The lime, after being drawn from the kilns and cooled, is conveyed by a belt conveyor to a Sturtevant crusher and the crushed lime is elevated to concrete storage bins and fed to a Kritzer hydrator. From there it is carried to a Raymond pulverizer, passed through a Raymond tubular collector and stored in the finished product bins ready for the Bates packer. As at the other plants, a small crusher plant is operated in connection with this quarry, the byproducts of which find the usual commercial outlet.

Louisiana (Mo.) Plant

Plant No. 4 is located about two miles north of Louisiana, Mo., on the Chicago, Burlington and Quincy railway. It parallels at this point the Mississippi river. This plant consists of four stone kilns. The quarry, which is about 150 ft. above the kiln tops, is an open face cut and consists of stratified limestone of a very excellent quality. It has been found by research work that this particular lime is superior for a caustic in sulphate pulp manufacturing. Practically the entire output of this plant goes to pulp mills making this kind of product. Recently the company made experiments to drive tunnels into this face in order to avoid heavy stripping with which they were confronted. This has proven very successful and the developments, which are necessarily very slow, are all that can be hoped for. All of the lime from this plant is shipped in bulk as it goes to the large users.

Missouri—one of several plants specializing in chemical lime

Springfield Plant

Plant No. 5 is located at Springfield, Mo., and is one of the few lime quarries in the United States which uses cord wood exclusively for burning. The company acquired this plant in 1898 from what was then known as the Springfield White Lime Co. The quarry and plant were situated about three miles southwest of the old town of Springfield, but as that community developed and grew in the direction, it is now situated in the heart of a fine residential section of the city. The limestone found in southwestern Missouri is a very excellent quality and enjoys a splendid reputation all over the United States. The quarry is below the ground level with an average face of approximately 60 ft. in depth. The limestone is overlaid with a red clay which must be removed before quarrying. A Cyclone electric well drill is used for drilling and the secondary breaking of boulders and large pieces of rock is made with Denver air jack-hammers. All the stone is loaded by handed in V-shaped quarry cars and hauled to the foot of the incline by horses. Two Gardner single-stage air compressors furnish the air for the drilling in the quarry. Sufficient area has been developed so that the quarry is now being worked for a lower level. It is expected to sink a face of 20 ft., as the limestone indicates the same quality and is easily obtained.

The cars for the lime kilns are hoisted with a Lidgerwood hoist and the spalls are sent to the crushed-stone plant. There are nine kilns in this battery, the inside diameter 6x8 ft., with steel shells and average approximately 35 ft. in height. The wood supply for wood burning is from the surrounding country, as Springfield is in the heart of the Ozark mountains. This community has developed very rapidly and there is an ample supply of excellent grade wood to be had. After the lime is drawn from the kilns and cooled on the floor, that which is to be barreled, is conveyed to a McLanahan roll crusher, then elevated to steel storage tanks.

The bulk lime is loaded directly into cars and the lime for the hydrating department is sent to a Sturtevant crusher. The steel storage tanks are 42 ft. high and 15 ft. in diameter and hold approximately 300 tons of crushed lime. Beneath these tanks are loading spouts. Screens in the spouts take out the fine lime, which is also conveyed to the hydrating department. The barreled lime is then loaded directly into cars.

In the hydrating department, after the lime passes through the Sturtevant crusher, it is elevated into a steel storage bin and by gravity into a Kritzer hydrator. After passing this it is conveyed into a Raymond pulverizer through the air-separating system and then into the bins ready for the finished product. One Bates packer takes care of this. As there is a large demand for barreled lime from this plant, a well equipped machine cooper shop is maintained, where all of the barrels used in the plant are made. The power for this plant is furnished by the Springfield Gas and Electric Co., a local institution, and each department is equipped with General Electric Co. motors.

White Bear Plant

The sixth plant of the company is located at White Bear, Mo., and consists of a crushed-stone unit only. Many years ago lime was burned at this plant, but it was abandoned on account of the small operation. The rock at White Bear now finds a market for commercial purposes in road paving and concrete construction. The screenings and pulverized limestone made are sold for agricultural purposes.

Personnel

The officers of the Marblehead Lime Co. are Bernard L. McNulty, president; J. Kng McLanahan, vice-president; W. J. Stewart, vice-president; R. S. Peotter, secretary-treasurer; E. E. Long, superintendent Springfield plant; A. U. Long, general superintendent at Quincy, Ill.; A. E. Erbe, purchasing agent; L. H. Eberhart, chief engineer; Wallace E. Wing, chemist; M. R. Matthews, sales manager; F. H. Belden, assistant treasurer and traffic manager; J. M. Palmer, manager, Kansas City office; L. R. Stalberg, manager, Hannibal office.

How the International System Overcomes the Seasonal Nature of the Cement Industry

THE picturesque statement that "the sun never sets on the British empire" is frequently employed to convey an idea of geographical distribution. The same idea, expressed in terms of latitude instead of longitude, has been paraphrased to apply to the International System in the equally picturesque statement that "it is never winter in the International System."

A definite plan for overcoming the seasonal character of the cement industry was a fundamental idea in the minds of those who organized the International system with cement mills located in both the northern and central part of the United States and on both sides of the equator.

Approximately 60% of the annual cement shipments for the United States as a whole are made in five months out of the 12. In the northern part of the United States the season is necessarily shorter than in the southern part, where, particularly in the extreme south, the shipping season extends over the entire year.

With southern as well as northern properties the average season of International's properties in this country is lengthened. In addition, the Cuban mill ships during practically the entire year. Crossing the equator, the season of the Uruguay and Argentine plants offsets the winter season of the northern mills.

Thus the season of heavy shipments in one locality balances the dull season in others. This has the effect of keeping the rate of shipments at a more constant level throughout the year.—*International Bulletin.*

British Columbia Gypsum Company Plant Nearly Completed

MANUFACTURING operations at the new plant at Liverpool, B. C., of the British Columbia Gypsum Co., will begin shortly. The buildings, made of corrugated iron are the plaster plant where calcining and mixing is done which is 220x72 ft., and the plaster board plant, 230x80 ft. All the machinery is electric driven and requires about 500 hp. Construction of the wharf on the Fraser river which is 300x20 and has two approaches has begun. The channel is being dredged to a depth of 30 ft. to allow the largest freighters to dock. Raw material is obtained from a deposit at Falkland, about 150 miles from the plant and is carried by rail. An aerial tramway is being constructed to carry the gypsum from the mine to freight cars. The company intends to export most of its finished product to New Zealand and Australia where a ready market exists for it. A preferential tariff and all water transportation to these countries are features of this exportation. When in full operation the plant will employ about 100 men and produce 200 tons of finished product per day. J. R. Spear, of long experience in the gypsum industry, is in charge of construction and will take up the management of the plant on its completion.—*New Westminster (B. C.) Columbian.*

Tennessee Phosphate Industry Picking Up

RICHARD W. SMITH, assistant geologist, Tennessee Geological Survey, writes: "You will be interested to hear that the raw ground rock phosphate industry in Tennessee is picking up decidedly this summer. The Tennessee-Illinois Phosphate Co., at Twomey in the Centreville district has been running night and day for several weeks, and the Ruhm Phosphate and Chemical Co., Mt. Pleasant, has run steadily this summer. Orders for September deliveries have greatly increased over last year's orders."

Mica Production in 1924

THE total quantity and value of domestic uncut mica sold by producers in the United States in 1924, as reported by the Bureau of Mines, was 5,439 short tons, valued at $299,277. Of this quantity 730 tons (1,460,897 lb.), valued at$ 212,035, was sheet mica; the rest was scrap mica.

Mining for Crushed Stone Extensively Adopted Around Kansas City

Observations—First Stop on Way to Pacific Coast

By Edmund Shaw
Editor, Rock Products

KANSAS CITY is doing a lot of building this year, some timid souls are saying too much. But the city has lagged somewhat during the period of agricultural depression and liquidation of debts, contracted in the flush times that followed the war, and now finds that it must do a lot of building to meet the demands of increased business and a steadily increasing population. This has brought about a strong demand for building material, especially concrete aggregate, and the demand for aggregate has been further increased by the big road building program of the state of Missouri.

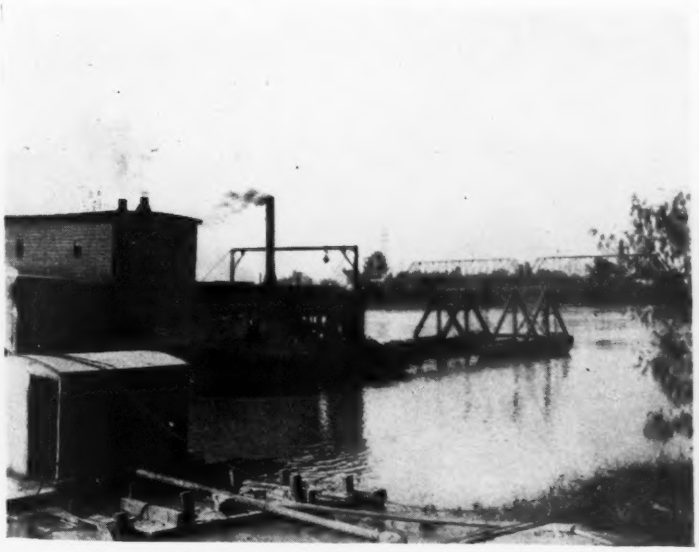
The aggregate situation in Kansas City and its surroundings is peculiar. Sand is fairly abundant in both the Missouri river and the Kaw river, although it needs pretty careful preparation to make a good fine aggregate. The crying need is for good coarse aggregate. There is only one gravel plant in the whole district, that of W. M. Spencer, and that has not been producing long. The great bulk of the coarse aggregate used comes from small crushing plants working on the outcrops of the limestone ledges which have been cut through by the two rivers.

It is said that there are 51 companies and individuals producing crushed stone in and around Kansas City. There is no large plant but there are a few well-equipped plants that produce on a fair-sized scale. The majority of the plants are small affairs producing a few truck loads daily. When a really good sized order comes along a number of them will combine to fill it. It took nine of them to fill one order recently.

Top of 250-ft. shaft at Smithville limestone mine

And much of the stone is poor stuff, full of shale, chert and mud balls. The state could not think of accepting it for highway purposes, and the road building program has been slowed down because the few regular producers who can make stone that will meet highway specifications have not been able to meet the demand. Only one or two of the many ledges that outcrop near Kansas City contain stone that is up to standard and they are deeply buried in most places under ledges of worthless stone and dirt. The life of the crushed stone man who wanted to make a really good product has not been a happy one. He had to produce at a high cost and sell in competition with low cost inferior material. It is the same situation as that of the washed sand and gravel plant competing with the wayside pit transferred to the stone industry.

However, there are signs that this is passing. Architects and engineers are demanding a better grade of material. The one-man wagon quarries are finding the outcrops harder to work and are meeting more opposition from nearby property holders, and the regular producers are developing new methods. The next year or two may see a big change in the



Dredge No. 2 of the Stewart Sand Co., fitted with new cutting device

New cutting device for suction dredges being tried out by Stewart Sand Co.

crushed stone industry in Kansas City.

Mining in the place of quarrying promises to produce a better material at a lower cost. The Kansas City Quarries Co., with plants at Leeds and Roselands, which is the largest producer in the district, is preparing to substitute mining for quarrying on a large scale. But the method is already in operation. The Consolidated Crushed Stone Co. tried it on a small scale at its Gallatin quarry and the Clay County Crushed Stone Co. has a mining operation in full swing at Birmingham, six miles from North Kansas City. These openings have been made in the Bethany Falls ledge at this point and a very good small crushing and screening plant has been erected. It is turning out six cars a day of excellent material and could sell a lot more than it produces. Another season will probably see a considerably enlarged plant there. J. F. Rhodes, the president and manager of the company, says that he is thoroughly satisfied with the system and its results, and he believes that mining is the only practical method for this district.

The biggest thing which is planned for the district is the new crushed stone plant of the Missouri Portland Cement Co. which will be built shortly. This company is already mining stone for making cement and it is said that the first intention was to put the crushing plant under ground, following a practice now coming in favor with some of the large metal mines. But it is understood that this plan has been abandoned and that a plant of the conventional type will be erected on the surface. Allis-Chalmers engineers are now making the drawings for it.

A number of other plants are building or are to be built shortly. The Kansas City Quarries Co. is putting up a new plant at Sharp Station on the electric line to St. Joe. This will have No. 6 and a No. 4 Austin crushers, which are already on their foundations. A 120-hp. Fairbanks-Morse gasoline engine will furnish the power. C. Atwood is moving his plant at South Liberty to a new location. A new quarry is to be opened at Excelsior Springs. Thomson Bros. are putting in a plant at Fifty-third street and the Frisco railroad in Kansas City, Kans., and the American Crushed Rock Co. is building at Seventy-sixth street and the Frisco tracks. These are all regular producers, making shipments by rail as well as by truck.

Outside of the district, or perhaps on the edge of it, is the Blackwater Stone Co.'s quarry, near Marshall, a little over 100 miles from Kansas City, which has just begun production. It is working day and night shifts and producing 30 cars a day, practically all of its production going into highway work. This operation is on the Burlington ledge, which is an altogether different formation from anything that is exposed at Kansas City as it is a very high calcium stone in a ledge that

Plant of the Clay County Crushed Stone Co. near Birmingham, Mo.

Preliminary work at the Blackwater Stone Co. quarry

Entrance to underground workings of the Consolidated Crushed Stone Co. at Gallatin, Mo.

is practically without a seam. The plant was built by Allis-Chalmers engineers and the quarry operation uses two Sanderson-Cyclone drills and two Bucyrus steam shovels. A fuller description will be published shortly.

The president of the Blackwater company is R. Newton McDowell, who promoted the Consolidated Crushed Stone Co., with quarries at Smithville and Gallatin. These became pretty well known to the public last year because they were in part financed by a loan from the Missouri state highway commission. Both are closed now and their future is a matter of considerable speculation. At Smithville a 250-ft. shaft has been sunk to reach good rock and a hoisting equipment is on the ground that will handle a 10-ton skip. Mining was tried at the Gallatin quarry with considerably more success than open quarrying, so if either or both of these plants resume operations they will mine the stone instead of quarrying it.

The sand business is booming. The Stewart Sand Co. bought out its largest rival, the Kaw River Sand Co., about six months ago and its sales now are considerably in excess of 100,000 tons per month. It is worth noting that the price of sand was lowered after the merger, one of the few instances in industrial history in which a consolidation of rival companies was followed by a lowering of prices. The increased sales are taxing the production facilities of the company, but methods have been found of increasing production without increasing costs. One of these has been the application of cutters to the sand dredges, which is new in this locality, although they have been used on contractors' dredges. One of the Stewart dredges has been fitted with a cutter designed by W. H. K. Bennet and another with the Thurston suction feeder, a device which is still in the experimental stage.

The other regular producers, the Muncie Sand Co., the American Sand Co., and the so-called "independents" who operate on the Kaw river are all busy. The writer counted six dredges at work on a half mile of the river between the American plant and the Stewart No. 2 plant (the one which it acquired from the Kaw River Co.).

Woods Bros. have built a sand washing plant on the Missouri river not far from where the "twenty cent" sand was produced. A new plant is also building at Bonner Springs on the Kaw.

The Spencer sand and gravel plant is about 20 miles from the city, in Kansas, and is an up-to-date operation. The bank is about 40 ft. high and is worked by a Marion electric shovel. The dirt is brought to the plant by a dinky in side dump cars over a grizzly, the oversize going to a No. 5 McCully gyratory crusher. A belt takes everything to a plant of Link-Belt design with conical screens and sand cones.

Bell Columbia Marble Company Prepares for Operation

THE Bell Columbia Marble Co., Columbia, Calif., which recently acquired outright the holdings of the Bell Marble Co. at Columbia, is rapidly getting things in shape for operating the property on a large scale. It is expected that sufficient progress will have been made in the preliminary work of installing new and larger equipment and in the erection of necessary buildings within the next few weeks to permit actual quarrying operations to commence.—*Stockton (Calif.) Independent.*

Munger Rock Company Has Modern Plant Near Phoenix, Arizona

JUST south of Phoenix the Munger Rock Co. has established its modern crushing plant of 200 cu. yd. per day capacity. Within two months of the start of erection it began the delivery of material to supply nearly the whole of Mariposa county's construction work. There is under lease 40 acres of an old river bed channel and crushing machinery capable of producing all sizes of gravel is in operation. An inclined roadbed of 26-gauge track leads to the pit and a ½-yd. Sauerman scraper conveys the material to the 4-125-yd. bunkers, from which a skip and belted hoist hauls it to the plant, where it is crushed, washed and screened.

The officers of the concern are: C. P. Munger, president; Herman Douglas, superintendent, and E. I. Chapman, office and sales manager.

Jordanville Plant Almost Completed

RAPID progress is being made in the construction of the $250,000 crushed stone and limestone plant at Jordanville, N. Y. The 70-ft. facing has been cleared and holes are being drilled for the initial blast or shot. The blacksmith shop and compressor house are already built and ready for operation. Concrete foundations for the four crushers are finished, and foundations are now being built for the six concrete silos which will be used as storage bins.

The rotary kiln, 110x8 ft., a part of the equipment for the lime plant which was shipped from Nashville, Tenn., has been received and unloaded. Transformers for substation have been received and are being installed.

A greater portion of the machinery, such as crushers and conveyors, have been shipped and will be installed at an early date. It is hoped to have the crusher and the lime plant in operation within a short time.—*Montgomery (N. Y.) Standard.*

Sioux Falls Sand Company Gets Better Rates

A SATISFACTORY agreement was reached on sand and gravel rates from Sioux Falls, S. D., between railroad representatives and the Sioux Falls Sand Co. A scheduled hearing of the company's complaint before the railroad commission was as a result postponed until after publication of the new rates agreed upon, when the complaint would be withdrawn and the case dismissed. Railroads represented were the Northwestern, Great Northern, Chicago, Milwaukee & St. Paul and others. The traffic bureau was represented by R. D. Springer.—*Sioux Falls (S. D.) Argus.*

Leavenworth Sand Companies Secure Lower Rates

THE Leavenworth, (Kans.) Chamber of Commerce recently announced that a cut in rates was secured for the sand companies of the city from railroads serving them. The reduction is said to put the local sand men on a parity with other cities in freight rates.—*Leavenworth (Kans.) Times.*

Ottawa Sand Companies to Combine

THE giant merger of four Ottawa sand companies into a $6,000,000 combine is nearing its final stages of completion, according to information from the *Ottawa (Ill.) Journal.* Sandmen here are only waiting the word from New York City that the deal is closed.

According to the plan as announced recently, the four local companies, the Ottawa Silica Sand Co., United States Silica Co., Crescent Silica Co. and Standard Silica Co., will be merged into a "wash and dried trust," a newly formed corporation, taking over the four plants of the companies, their extensive silica deposits and other properties.

All of the preliminary work is said to have been done in the merger plan, the properties of each of the local plants have been appraised and everything awaits the final completion of the deal.

Hauser Company Obtains Large Crushed Rock Contract

HAUSER CONSTRUCTION CO., of Oakland, Calif., today signed a contract under which they are to deliver millions of tons of Riverside rock for the $5,000,000 harbor improvements at Long Beach. In order to care for the increasing tonnage, the Union Pacific has already completed the laying of extra trackage from Bly Junction to the quarry proper. Tracks to care for hundreds of empty cars have also been placed, according to General Agent F. E. Midleton.

The contract calls for minimum daily shipments of 100 carloads of rock and maximum shipments of 150 cars daily.

Ormand quarry, Riverside, will start operation soon with a force of about 150 men and will continue to the end of the contract, which is expected to be late in 1927.—*Los Angeles (Calif.) Times.*

Hints and Helps for Superintendents

Pneumatic Car Dumpers

PROBABLY no feature of quarry and gravel pit operation offers so much room for originality and invention as the handling and dumping of cars. We have already described several automatic car dumpers, pole dumpers, etc., in these pages, but none that appeared to work more satisfactorily than the car dumper shown below. This is the invention of M. V. McKeon, superintendent of the Winchester (Mass.) plant of the General Crushed Stone Co., and adopted by this company at several of its plants.

The device is merely an air piston, or pneumatic hoist, reversed. It is placed in a pit adongside the track at the crusher hopper. It is set on a pin joint so that it moves freely through an arc at right angles to the track.

The head of the piston is a particular design, so that it will either push or pull. The kind of quarry car used is the standard side-dump contractor type, with the body off-center, so that it should dump by gravity as soon as the chain links are released. But, as every quarry man knows, it is a frequent occurrence for the load to be off-center enough to prevent the car dumping by gravity. In this case a good push with the top of the piston will do the trick, and very quickly.

The hook on the piston is fastened to the side of the car before the chains are released, so that the piston in coming out with an open escape valve serves to steady the car and keep it on the track. The valve is then closed and the compressed-air valve opened and the piston speedily rights the car.

The device was built at the plant. In this case the air-compressor house is within 50 ft. of the dumper. Rubber hose is used for the connection.

Lining an Elevator Well Below Water Line

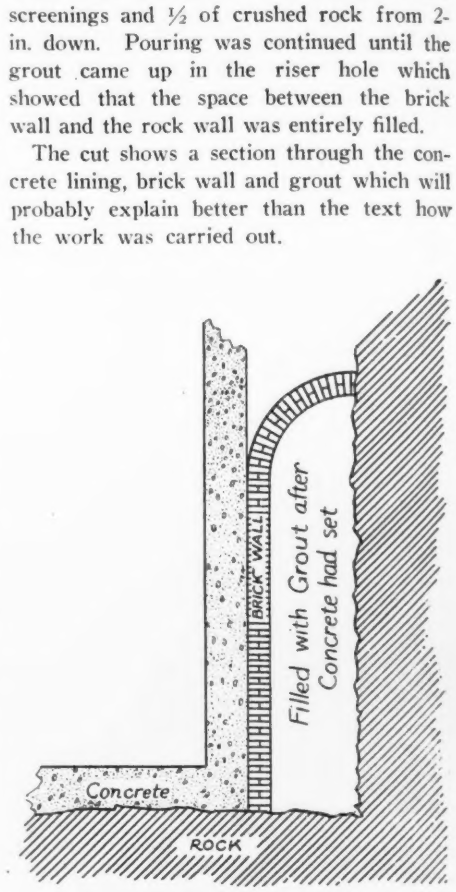
AT the new plant of the Columbia Quarry Co. at Krause, Ill., there is an interesting bit of engineering in connection with the setting of the No. 18 N primary crusher. The crusher is set at the level of the quarry floor and a hole had to be put down below the floor to take the stone box that receives the crusher discharge and the boot of the elevator that lifts it to the scalping screen.

A considerable quantity of water was struck when this hole was put down. A pump was installed to handle the water, but in order to place and fill the forms for the floor and sides conveniently it was necessary to dam off the water as well as to pump it.

This was accomplished by building a brick wall inside the rough walls of rock that had been left when the hole was blasted out. The wall had a curved top that joined the rock wall and this had strength enough to resist the slight upward pressure of the water at this level. A hole for the pump suction was left at one side and a "riser" hole on the other side.

The forms were placed so that the brick wall formed one side of the concrete lining after the concrete had been poured in the forms and set grout was poured into the space between the brick wall and the rock. This was a mixture of 2 of cement, 1 one screenings and ½ of crushed rock from 2-in. down. Pouring was continued until the grout came up in the riser hole which showed that the space between the brick wall and the rock wall was entirely filled.

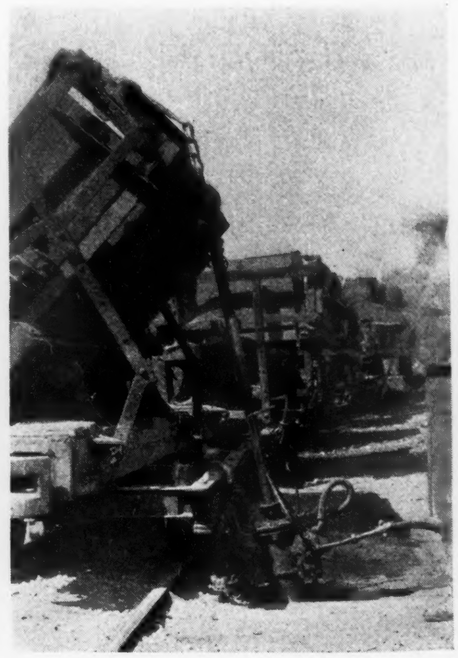
The cut shows a section through the concrete lining, brick wall and grout which will probably explain better than the text how the work was carried out.



Waterproofing an elevator well

Compressed-air car dumper

Attached to car with hook over side



Car in dumping position

Working a Cableway Excavator Over a Wide Area

AN interesting solution of a sand and gravel excavating problem was worked out by the Crow Creek Gravel Co. at its plant at Madison, Ark., last year. Later the method of excavating was changed, as it was found necessary to work parts of the deposit at a greater distance from the plant than could be covered by the cableway at first installed. But this in no wise lessens the value of the method, which might be successfully applied in some other cases where the conditions were such that it would meet the situation.

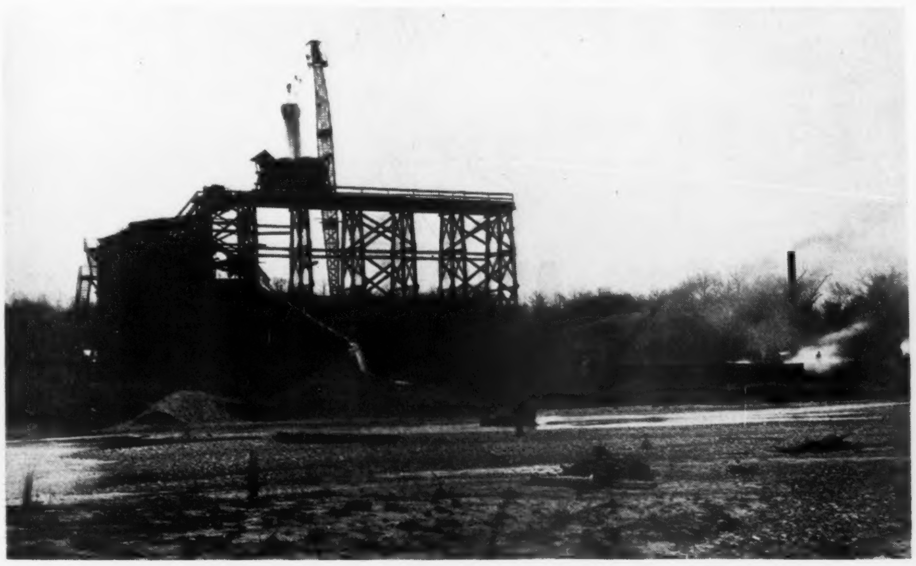
The purpose of the installation is to cover a wide area with a cableway dragline. The deposit is flat and from 6 to 18 ft. in depth, the average depth being 9 ft. It renews itself each year by the floods from the winter rains, so the production was merely a matter of covering sufficient area during the working season.

With a fixed hopper the position of the mast had to be changed to allow the bucket to work through a wide angle. This was a considerable job. In order to save the time and labor required to change the mast several times in a season a movable hopper was designed and installed and a belt conveyor was put in to take the material from the hopper to the washing plant.

The arrangement was due to V. A. Cordes, president of the company, and also president of the Wolf River Sand Co. He turned the idea over to the Stephens-Adamson Co. who designed the hopper and supplied the conveying system.

The hopper is 25 ft. square and it rests upon ordinary railway car wheels which run on railroad rails. There are wing boards on the side of the hopper to keep the material from spilling over. At the bottom of the hopper is an adjustable gate that allows the material to flow out on a 30-in. conveyor belt. The whole is mounted on a trestle about 125 ft. long.

The cableway outfit used with this was a Sauerman with 1½-yd. bucket. It was run by a Flory two-drum hoist.



Increasing the range of a cableway excavator

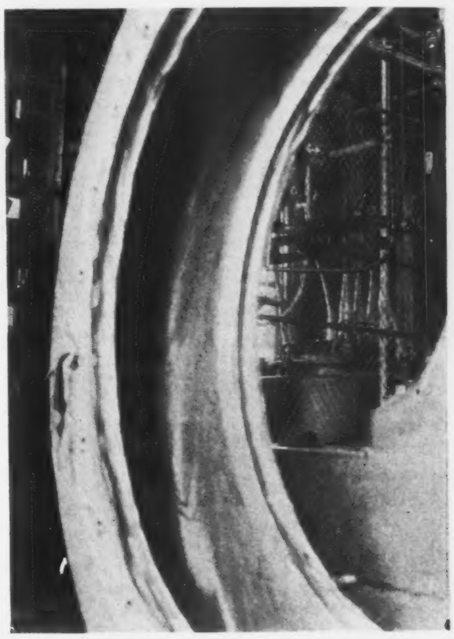
Travelin hopper over belt conveyor

Mast and traveling hopper on trestle

Repairing a Pump Shell

THE picture is a close-up of a part of the shell of a 15-in. pump which has been used on the sand and gravel dredge of the P. Koenig Coal Co. at Oxford, Mich. It is badly worn on the edges, as shown plainly in the picture. This wear increases the clearance between the shell and the runner and decreases the efficiency of the pump.

When such wear has decreased the pump efficiency so that it affects production seriously it is the policy of many companies to send the shell to the scrap heap, although the replacing of a shell is the most expensive repair that has to be made to a pump.



Pump shell repaired by welding

At the Koenig plant such shells are not discarded but are repaired by means of a welding outfit. The worn part is built up all the way around and the new metal is worked off to a true line. This is a tedious and a somewhat expensive operation but it is very much cheaper than buying a new shell.

At this plant an electric welding outfit is used but there appears no reason why an acetylene welding outfit would not do the work as well. Of course such a repair demands the skill of a trained craftsman who is thoroughly familiar with welding.

Other pump parts are welded at this plant. Cracked suction plates are found once in a while and these are easily repaired by the welding outfit.

Financial News and Comment

New England Lime Company New Preferred Stock Offering

E. B. MERRITT and Co., Bridgeport, Conn., are offering 1500 shares series "A" of the New England Lime Co. (Del.) new $1,000,000 offering 7% cumulative first preferred stock, at 97½ plus accrued dividend and 4500 shares series "B" at 97½ plus accrued dividend with a bonus of 2 shares of no par common stock (Voting Trust Certificate) with every 5 shares of preferred purchased. The financial statement of the company is given in the July 25 issue. On the prospectus of the bankers offering the stock the following letter from J. King McLanahan, president of the New England Lime Co. appears:

"I believe this stock to be an attractive investment for the following reasons:

"1. The New England Lime Co. has made money every year since its organization in 1902.

"2. The future prosperity of the new company is assured by the ownership of valuable deposits of mineral of a quality probably impossible to duplicate.

"3. Its plants are modern and splendidly maintained, representing the best practice in lime plant construction.

"4. Its location is excellent, having a market closely adjacent of 28,000,000 people, one-fourth of the United States.

International Cement Earnings 1925-1924 Compared

BELOW is a comparison of earnings of the International Cement Corporation for the first six months of this year, with the same period in 1924; also a summary of the first two quarter statements of this year:

Period—	2d Quarter 1925	1st Quarter 1925	—6 Mos. End. June 30— 1925	1924
Gross sales	$5,452,302	$3,782,201	$9,234,503	$7,448,912
Less packages, discount and allowance	990,663	650,576	1,641,239	1,343,795
Net sales	$4,461,639	$3,131,626	$7,593,265	$6,105,117
Manufacturing costs	2,126,799	1,509,353	3,636,152	3,082,077
Depreciation	270,406	171,355	441,761	447,559
Shipping, selling and administrative expenses	737,951	573,434	1,311,385	1,106,856
Net profit	$1,326,482	$877,484	$2,203,966	$1,468,625
Miscellaneous income	5,150	8,014	13,164	24,036
Total income	$1,331,632	$885,497	$2,217,129	$1,492,661
Reserve for Fed'l income taxes and contingencies	221,029	171,559	392,588	372,357
Net to surplus	$1,110,603	$713,939	*$1,824,542	$1,120,303

*These earnings after allowing for preferred dividends are equivalent to $4.26 per share for the six months on the 400,000 shares of common stock outstanding on June 30, 1925.

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Alpha Portland Cement Co. (common)**	Sept. 1	100	136	136	1¾% quar. Sept. 1
Alpha Portland Cement Co. (preferred)**	Aug. 14	100	105	....	1½% quar. Sept. 1
Arundel Corporation (sand and gravel—new stock)	Sept. 1	No par	34¾	35	30c quar. Sept. 1
Atlas Portland Cement Co. (common)	Sept. 3	No par	52	52	50c quar.
Atlas Portland Cement Co. (preferred)**	Aug. 14	33⅓	44	48	2% quar. July 1
Bessemer Limestone and Cement Co. (common)‡	Aug. 27	100	130	140	1½% quar. Oct. 1
Bessemer Limestone and Cement Co. (preferred)‡	Aug. 27	100	106½	108	1¾% quar. Oct. 1
Bessemer Limestone and Cement Co. (convertible 8% notes)‡	Aug. 27	....	125	135	8% annual
Boston Sand and Gravel Co. (common)	Aug. 29	100	70	70	2% quar. July 1
Boston Sand and Gravel Co. (preferred)	....	....	....	....	1¾% quar. July 1
Boston Sand and Gravel Co. (1st preferred)	....	....	....	....	2% quar. July 1
Canada Cement Co., Ltd. (common)	Sept. 3	100	111¾	112	1½% quar. July 16
Canada Cement Co. Ltd. (preferred)	Aug. 4	100	78	78½	1¾% quar. Aug. 15
Canada Cement Co., Ltd. (serial bonds)	June 30	....	102½	....	3% semi-annual
Charles Warner Co. (lime, crushed stone, sand and gravel)	Aug. 14	No par	25⅞	26	50c quar. July 10
Charles Warner Co. (preferred)	Aug. 3	100	98	102	1¾% quar. July 23
Dolese and Shepard (crushed stone) (a)	Sept. 2	100	53	55	1½% quar.
Giant Portland Cement Co. (common)**	Aug. 29	50	31	32	
Giant Portland Cement Co. (preferred)**	Sept. 1	50	53	53	3½% semi-ann. June 15
Ideal Cement Co. (common)‖	Sept. 3	No par	70	75	$1 quar. June 30
Ideal Cement Co. (preferred)‖	Aug. 28	100	105	110	1¾% quar. June 30
International Cement Corporation (common)	Sept. 1	No par	68	70	$1 quar. Sept. 30
International Cement Corporation (preferred)**	Aug. 28	100	104	105	1¾% quar. Sept. 30
International Portland Cement Co., Ltd. (preferred)	Mar. 1	....	30	45	
Kelley Island Lime and Transport Co.	Sept. 2	100	107¼	110	2% quar. July 1
Lawrence Portland Cement Co.**	Aug. 14	100	107	115	2% quar.
Lehigh Portland Cement Co.‖	Aug. 28	50	88	92	1½% quar.
Michigan Limestone and Chemical Co. (common)‖	Aug. 28	....	23	25	
Michigan Limestone and Chemical Co. (preferred)‖	Aug. 28	....	23	25	1¾% quar. July 15
Missouri Portland Cement Co.	Sept. 3	25	68½	69½	25c quar. Aug. 1; 25c ex. Aug. 1.
Missouri Portland Cement Co. (serial bonds)	May 29	....	104½	104½	3¼% semi-annual
Monolith Portland Cement (common)	Aug. 13	....	7	7½	
Monolith Portland Cement (units)	Aug. 13	....	21	23	
Monolith Portland Cement (preferred)	Aug. 13	....	6½	7	
North American Cement Corp. 6½s 1940 (with warrants)	Aug. 29	....	98⅝	99½	
Pacific Portland Cement Co., Consolidated	Aug. 29	....	....	81	
Pacific Portland Cement Co., Consolidated (secured serial gold notes)§	July 23	....	99½	101	3% semi-annual Oct. 15
Peerless Portland Cement Co.*	Aug. 28	10	....	8¼	
Petoskey Portland Cement Co.*	Aug. 28	10	8	9	1½% quar.
Pittsfield Lime and Stone Co. (preferred)	....	100	....	....	2% quar. Apr. 1
Rockland and Rockport Lime Corp. (1st preferred)	Sept. 1	100	98	....	3½% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (2nd preferred)	Sept. 1	100	70	....	3% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (common)	Sept. 1	No par	70	....	1½% quar. Aug. 1
Sandusky Cement Co. (common)*	Sept. 2	100	101	108	2% quar. July 1
Santa Cruz Portland Cement Co. (bonds)	Aug. 29	....	104¼	110	6% annual
Santa Cruz Portland Cement Co. (common)	Aug. 29	50	109	....	$1 Apr. 1
Superior Portland Cement Co.	Mar. 1	100	....	120	
United States Gypsum Co. (common)	Sept. 2	20	195	196	2% quar. Sept. 30; $1 ex. Sept. 15
United States Gypsum Co. (preferred)	Sept. 3	100	116	118	1¾% quar. Sept. 30
Universal Gypsum Co. (common)†	Sept. 2	No par	21	23	
Universal Gypsum V. T. C.†	Sept. 2	No par	19	22	1¾% quar. Sept. 15
Universal Gypsum Co. (preferred)†	Aug. 5	....	76	....	
Universal Gypsum Co. (1st mortgage 7% bonds)†	Sept. 2	....	99	(at 6½%)	
Wabash Portland Cement Co.*	Aug. 3	50	60	100	
Wolverine Portland Cement Co.	Aug. 3	10	10	12	2% quar. Aug. 15

*Quotations by Watling, Lerchen & Co., Detroit, Mich. **Quotations by Bristol & Bauer, New York.
†Quotations by True, Webber & Co., Chicago. ‡Quotations by The Valley Investment Co., Youngstown, Ohio.
§Quotation by Freeman, Smith & Camp Co., San Francisco, Calif. ‖Quotations by Frederic H. Hatch & Co., New York.
(a) Quotations by F. M. Zeiler & Co., Chicago, Ill.

Editorial Comment

Lime as a Chemical

It is now several years since we first began co-operating with the National Lime Association in a special chemical lime issue of Rock Products to coincide with the National Expositions of the Chemical Industries. In those few years far more technical progress has been made in the lime industry than is generally appreciated. But one thing stands out above all others in this forward movement of the lime industry. It has greatly increased the mortality among small localized operations. In 1915 the U. S. Geological Survey listed 905 lime plants in operation; in 1923 (the latest available statistics) 467 plants. Today it is doubtful if there are over 450 active operations. During this period the production of lime has shown increases of 10 or 12%, and the value per ton has about tripled. These facts in themselves are ample proof that lime is fast being recognized as a chemical, and the manufacture of it is now a modern industry requiring scientific methods and control at least to the same degree as portland cement manufacture.

A good example of the evolution that is taking place in the lime industry is illustrated elsewhere in this issue in the description of the Marblehead Lime Co. operations. Some of this company's plants are very old and the operations originally were as crude as the average old-time lime plant. Nevertheless the present owners have introduced modern methods of scientific control, both in the quarry and the kiln operations, and they are turning out a lime that is highly regarded as a *chemical*.

This year we are publishing our chemical lime articles in time for our lime-plant readers to study them prior to the Chemical Show, where the National Lime Association will have an exhibit, as well as will a few individual lime manufacturers. Every lime manufacturer will find the Chemical Show interesting and intructive, and a visit is well worth the time and effort of any lime manufacturer who sells the chemical trade.

Conflicting Testimony

Bearing out our analysis of the present conflict of interests between stone and gravel aggregates for concrete (Rock Products, July 25, p. 59) two good examples have recently come to hand which illustrate how difficult it is going to be to draw any general conclusions as to comparisons of one group as a whole with the other group as a whole. Both gravel and stone vary so much in different localities that any definition of the physical characteristics of either can never have general application. And too many other variables are present in every test to pin the rose on the real hero.

A report on the condition of the concrete-paved Ohio post road between Zanesville, Ohio, and Licking River, after 10 years service, by F. H. Jackson, engineer of tests, U. S. Bureau of Public Roads, and published in *Public Roads,* the official bulletin of the Bureau, for June, draws this conclusion: "Inasmuch as soil, drainage, and traffic conditions are practically identical, it would appear that the difference in cracking was due to some characteristic of the concrete itself. As previously stated, a slightly richer mix was used in the gravel concrete—i. e., 1:1½:3 as against 1:1¾:3 for the limestone concrete—but all other factors remained exactly the same, with the exception of the coarse aggregate. It is fair to assume, therefore, that the difference in the cracking of these two sections is due to the character of the coarse aggregate used. It will be noted that there is very little difference in the crushing strength of the two classes of concrete. Unfortunately, there are no transverse tests of the concrete available, but it is possible that the difference in cracking is due to the high tensile strength of the limestone concrete."

Under the caption "Washed Gravel vs. Crushed Rock in Concrete," a recent issue of the *Engineering News-Record,* contains the following paragraph: "Under direction of the city engineering department of Fort Worth, Texas, tests were recently made of 200 concrete cylinders, half using washed gravel and half using crushed stone. The gravel was from nearby deposits in the flood plain of a fork of Trinity River, which are the result of erosion of the rocks of the Lower Cretaceous (Comanchean) Period; the pebbles are hard and sound but their surfaces when magnified show countless minute pits. There were two mixes of concrete, 1:2:4 and 1:2½:5. After molding, the test cylinders were placed in damp sand and sprinkled daily. After 90 days, on crushing the washed gravel cylinders showed strengths of approximately 3,700 and 3,400 lb. per sq. in. for the two proportions and the crushed rock 2,700 and 2,050 lb. The superiority of sound washed gravel over sound crushed stone is ascribed partly to the fact that the facets of the crushed stone are glassy whereas the surface of the gravel pebbles is rough and pitted, also to the smaller percentage of voids in the gravel aggregate. These tests were described by John A. Hawley, consulting engineer, in a paper before the Texas Section of the American Society of Civil Engineers. Mr. Hawley performed the tests, with C. B. Collard, principal assistant city engineer, Fort Worth. Dudley L. Lewis is city engineer there."

Obviously, a controversy on the virtues or shortcomings of the two materials may be endless; and the old adage that "the devil can quote scripture to his purpose" may be amply demonstrated.

Developments and Complications in Building of Lewiston Portland Cement Plant

Not Permitted to Sell Stock in Idaho — Dispute Over Limestone Property

NEWSPAPER reports from Boise and Lewiston (Idaho) give some interesting gossip concerning the proposed new Lewiston Portland Cement Co. plant. One from the Boise *Statesman*, August 2, reads as follows:

"Permit to sell stock in Idaho has been denied the Lewiston Portland Cement Co., it was announced recently by E. W. Porter, commissioner of finance. The company applied for a permit to sell $100,000 worth of stock in the state about the middle of July.

"At that time it was denied but since then the commissioner says he has heard the company's agents are selling stock in the northern part of the state in violation of law.

"Mr. Porter said he denied the permit on the ground that the plan proposed by the company did not provide a reasonable promise of a return to the investor nor was it fair, just or equitable, he claimed. The articles of incorporation contained no guarantee that a fair and honest business was to be transacted."

The Boise *News* of July 31 states:

"Judge Frank S. Dietrich, of the United States District Court, recently partially denied an injunction sought in the case of Elliott Richardson against Ben L. Schultz, transferred from the Lewis County State Court. Judge Miles Johnson had granted a temporary injunction to Richardson to keep the defendant from collecting $15,000 alleged due on a contract for sale of lime deposits.

"Judge Dietrich ordered both parties in the case to execute a receipt to the Lewiston Portland Cement Co. for the amount due, the receipt and money to be deposited with the clerk of the United States court pending final deposition of the case. Mr. Schultz had contended that Mr. Richardson had forfeited his rights to the mining property by failing to do certain assessment work. Judge Dietrich enjoined Mr. Schultz and other defendants from again filing proof of publication of Mr. Richardson's forfeiture until the case can be tried on its merits.

"Except in these two respects the judge cancelled the injunction of the state court."

Engineer's Report

The Lewiston *Tribune* of July 26 states:

"The cement plant proposed for the Mission creek country by the Lewiston Portland Cement Co. is pronounced a very practical business proposition by M. Steinmetz, engineer for the New York firm of Kennedy-Van Saun Manufacturing and Engineering Co. Mr. Steinmetz was in Lewiston on July 7 and 8 and devoted two days to the examination of the limestone and clay deposits, the location of the mill site and the route for the proposed railroads from the quarries to the mill and from the mill to the Camas Prairie line at Jacques Spur.

"At the time Mr. Steinmetz visited Lewiston, he said his preliminary investigations had indicated the project entirely sound, but his complete report was not prepared until after his arrival in New York and reports by chemists on the limestone and clay deposits had been examined.

"The meat of the report prepared by Mr. Steinmetz is that the project is sound, that there is enough material above the quarry floor to keep a plant of 2000 bbl. daily busy for 30 years and that the plant should put a first-grade cement in the bags for $1 per barrel. The text of the report is as follows:

"In compliance with your instructions, I am making this report to you and the Lewiston Portland Cement Co., Lewiston, Idaho, of my personal inspection on July 7 of limestone deposit in properties owned by the Lewiston Portland Cement Co., located on Mission creek in the Lapwai Indian reservation, Lewis County, Idaho, about 20 miles southeast of Lewiston in the northwest quarter section 15, township 34 north, range 3 west, about six miles from the Camas Prairie railroad, which is reached over a fair auto road leading from Jacques Spur station, a station on the Camas Prairie, from which point the proposed railroad spur is to be constructed to serve the plant, which is to be constructed about two miles up Mission creek adjacent to clay deposit.

"The lime deposit lies on the west slope of Mission creek valley; outcrop rising in elevation approximately 2,000 ft. long. Not being drilled, it is impossible to tell how deep it runs below the floor of the valley. I estimate from surface outcrop there is enough lime rock in sight to operate a 2,000-bbl. cement plant for at least 30 years, and with the natural floor of the valley at base of deposit, using the open quarry method with steam shovel, or some other machine equal, rock can be quarried at a very low cost and transported to crusher at plant, which will be down the valley approximately four and one-half miles by way of railroad which can be constructed at a maximum of 2.6 per cent grade, which is all in favor as the loaded cars go down to crusher and only will have the empty cars to take up over the 2.6 per cent grade to quarry.

"According to the analysis obtained from samples of this lime rock by the various laboratories—University of Idaho, Northwest Magnesite Co., Moscow, Idaho; U. S. Geological Survey and C. M. Fassett Co., Inc., Spokane Laboratory and analysis of the clay deposit by the various laboratories, C. M Fassett Co., Inc., 209 North Wall street, Spokane; Talkenburg & Co., Secon and Wesler way, Seattle—properly mixed should manufacture a high grade of portland cement, using the wet process of manufacturing.

"The clay deposit lies on the west slope of Mission creek valley, beginning at a point approximately 50 ft. above the floor of the valley; about 400 ft. wide, with an average depth of approximately 8 ft. and about a quarter of a mile in length, now owned by the company. The amount of clay required to mix with the lime rock can, by means of machine, shovel or dragline, be excavated and transported to plant at a very low cost as the plant is to be constructed in floor of valley adjacent to clay deposit. A 2,000-bbl. plant can be laid out and constructed on the site now available with good foundation material, such as gravel, and plenty of water can be gotten on site at a very little cost as Mill creek flows through this property and has never been known to go dry. With a properly designed plant, with the low cost of power, and fuel available, as reported to me and the low cost of getting rock and clay to plant, the plant should manufacture portland cement not to exceed a cost of $1 per barrel.

"From my general survey of the surrounding country, the dam to be built, sawmill to be built, highways to be built and market conditions in general as pointed out to me, a 2,000-bbl. cement plant should do a very fine business in the territory mapped out for the sale of cement.

"All phases of the construction for the new plant will be soon under way, according to a statement by John McPherson yesterday. The bids for building the railroad were received several weeks ago and it is expected the contracts will be announced during August. The construction of the temporary plant buildings and the building of the telephone line will be under way within a short time.

"It is stated all phases of the plans are moving forward very satisfactorily and large operations will be under way by early fall. The company recognizes the demand at the present time for labor on the farms, but is planning to have the work laid out so that the several contracts can be inaugurated with large forces as soon as the present harvest rush is concluded. It is expected the plant will be in operation by next summer."

California Cement Projects

STATISTICS compiled by the California State Mining Bureau and published in its April, 1925 "Quarterly," show that cement is the most important single structural material in the mineral output of the state. During 1924 there was produced a total of 11,655,131 bbl., valued at $23,225,850 f.o.b. plant. This is an increase of 829,726 bbl. over the previous record figure of 10,825,405 bbl. in 1923; but a decrease of $2,773,353 from the 1923 value of $25,999,203. The lower sales prices prevailing in 1924 were due to the competition of foreign cements brought over in ballast and dumped onto our local markets duty-free. There is no import duty on this foreign cement, the bulk of which came from Belgium.

As in the preceding three years, the output came from nine operating plants in seven counties, and in 1924 employing a total of 3081 men. The three plants in San Bernardino county made a total of 4,354,119 bbl. valued at $7,571,370, the balance of the state's product coming collectively from a single plant in each of the following counties: Contra Costa, Kern, Riverside, San Benito, Santa Cruz, and Solano. For 1925 the new plant of the Pacific Portland Cement Co. at Redwood City, San Mateo county, is operating, and utilizing marine shells as a source of calcium carbonate.

Work on the new plant of the Yosemite Portland Cement Corp. at Merced, near Fresno, is slowly proceeding. A. Emory Wilson is president; W. A. Sutherland, vice-president; Murray Bourne, secretary-treasurer. This company owns a plant site of 145 acres located about two miles north of Merced, upon which they have a cement plant of 2000-bbl. initial capacity, about one-third completed. The plant has direct connections with the Southern Pacific and Yosemite Valley railroads, and the Santa Fe is preparing to build a spur track to the mill. The plans call for a mill of reinforced concrete and steel construction, using what is known as the "straight-line wet process." It will contain three kilns, already on the ground, 160 ft. long and 8 ft. in diameter. The finished cement is to be stored in six reinforced concrete "silos," each 30 ft. in diameter and 90 ft. high, having a capacity of 90,000 bbl. Electric power, furnished by the San Joaquin Light and Power Corp., will be used throughout. Water will be obtained from deep wells on the plant site and from the Merced River at the quarry site at Jenkins Hill, Mariposa county. The corporation has acquired approximately 1000 acres at the latter point containing immense deposits of high-grade limestone adjacent to the Yosemite Valley Railroad. The limestone deposits are in Sections 7 and 8, Township 3 North, Range 19 East, at an elevation of 1340 ft. at the railroad. Large open-face quarrying operations will be possible, with steam-shovel loading and spur-track transportation to the quarry crusher plant. The crushing department is planned to reduce the rock from quarry size to about ¾-in. in one operation, using a giant Williams mill of special design for the work. The distance from the quarries to the mill is approximately 63 miles. The other principal raw material required is clay. This will be mined at the mill site where extensive deposits of suitable clay have been developed.

When the Yosemite Portland Cement Corp.'s plant is completed there will be a total of 11 cement mills in California.

There is some probability of establishing a new cement plant in Calaveras county as indicated in preliminary work and property transfers already completed. William MacNider has been working for two years or more on plans for the financing and establishment of a cement plant at Kentucky House to utilize limestone deposits there and elsewhere in the county. These plans include a branch railroad from Valley Spring for which the original survey had to be changed on account of Stockton flood control project on Calaveras River. A second survey for the railroad has just been completed (May 1, 1925). Preliminary drilling and tests of the Kentucky House deposits have been about finished, and plans for the plant are now being considered.

Late in March, 1925, William MacNider, Charles P. Snyder, George B. Poore, Lloyd Baldwin and Robert Duncan deeded to Calaveras Cement Co. several options and contracts, and parcels of land containing limestone deposits in the vicinities of Kentucky House, Cave City and on O'Neill Creek. William Wallace Means and other easterners are reported to be interested in the new company, which has a staff at San Andreas in connection with the work.

Los Angeles Keeps Restriction on Foreign Cements

THE question of permitting the use of foreign cements in public works and streets of Los Angeles was settled recently by vote of the city council. The temporary ban imposed as the result of adverse reports of the city engineer was retained. The findings showed that foreign cement generally arrived in damaged condition and did not meet the city specification. Foreign cements will be allowed to compete for public construction only after proof of two years of successful use in private construction or only after January, 1926. The proponents for admission of foreign cements who had contended that domestic manufacturers because of this lack of competition had raised prices unnecessarily were shown that cement prices at Los Angeles were the lowest in years.—*Los Angeles (Calif.) Times.*

S. D. Clinton, Oregon Representative for Monolith Portland Cement Co.

S. D. CLINTON has been appointed Portland district representative for the Monolith Portland Cement Co. of California, relieving Yates F. Hamm, resigned. Mr. Clinton is well known throughout the Northwest, in the last seven years having been identified with the Vulcan Mfg. Co. and the King county engineer's office at Seattle, as manager for two years of the La Grande Concrete Pipe Co., and for the past year and a half with various enterprises in Portland. —*Portland (Ore.) Record Abstract.*

International Cement Makes Important Appointments

THE International Cement Corporation of New York announced recently that H. C. Koch has been appointed vice-president in charge of sales and publicity for the domestic and foreign properties of the International System.

It was also announced that upon the completion of the Norfolk plant of the Virginia Portland Cement Corporation, Ejnar Posselt will become vice-president in charge of operation and construction.

Mr. Koch has been general sales manager of International for several years, prior to which time he was in charge of the sales of the Texas Portland Cement Co. Before the formation of the International System, Mr. Koch had gained a broad experience in cement merchandising throughout the country.

Prior to taking charge of construction operations at Norfolk, Mr. Posselt was vice-president in charge of foreign subsidiaries in the International System. He is well known to the industry, having served in various technical capacities in this country for many years,

These appointments and assignments are in recognition of meritorious services which these men have given to the International System and in keeping with the expansion of that growing organization which recently acquired the Indiana and Alabama Portland Cement properties.

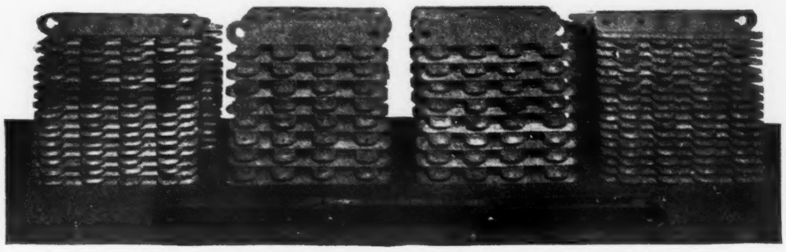
International Cement Stock for Employees

CIRCULARS are being sent to employes of the International Cement Corporation of N. Y. notifying them of the terms on which stock may be purchased. Stockholders recently authorized directors to reserve all or any part of 20,000 shares of common stock for sale at not less than $50 per share to officers and employes,

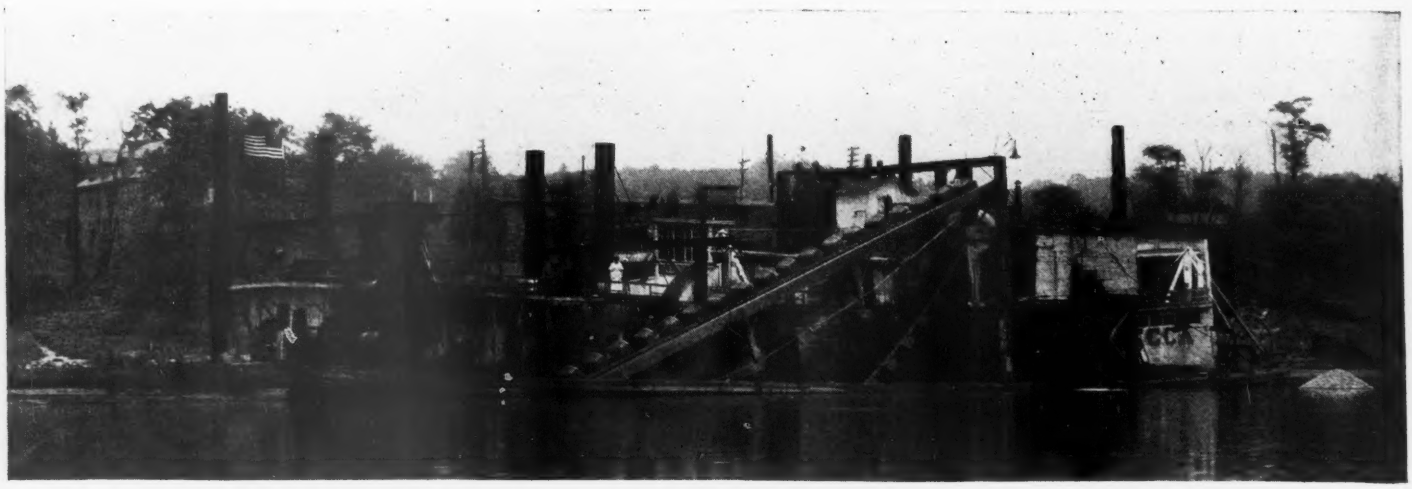
New Machinery and Equipment

Rolled Manganese Dredge Chain Links

WHAT the manufacturer claims is the "longest, strongest and heaviest" rolled manganese-steel, flat-link, dredge chain ever made is illustrated herewith. It is over 400 ft. long (single strand, 24-in. pitch) and weighs 4½ tons. The center links are 1½-in. thick, 4-in. wide, 30-in. long with 1 13/16-in. plain pin holes. The side links are ¾-in. thick, with keyed pin holes.



Rolled manganese-steel dredge chain links



Ohio River sand and gravel ladded dredge equipped with rolled manganese-steel chain

The links were made by the Manganese Steel Forge Co., Philadelphia, Penn., of "Rol-man" bars having a tensile strength of 150,000 lb. per sq. in., and a shearing strength of 105,000 lb. per sq. in. All holes were punched from the solid, rolled bar. The sand and gravel dredge is one of those in the Pittsburgh district operating on the Ohio River.

A New Explosive Particularly for Underground Work

FOLLOWING many experiments both in the laboratory and in the field, the Hercules Powder Co., Wilmington, Del., has announced a new high explosive—Hercules Special No. 3. It is especially designed for underground mining where fumes are important and it is adapted for underground work in ore, shale, clay, gypsum, and, because of its non-staining qualities for use in salt mines.

Hercules Special No. 1 and Special No. 2 were two important contributions of recent years to the blasting industries. Where these explosives are suitable, a 15% reduction of blasting costs by their use is not uncommon, according to the manufacturers. They are most widely adapted to quarry and open-pit work.

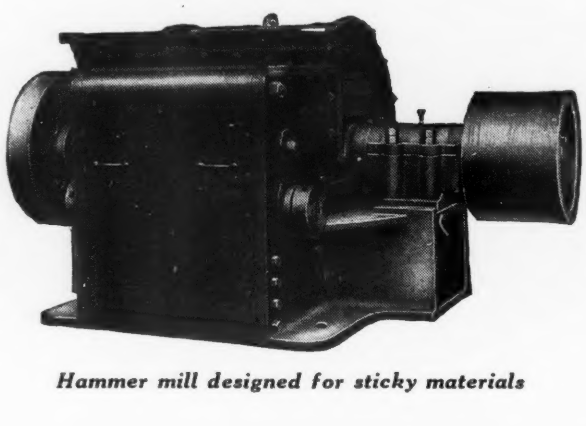
The economy of Special No. 1 and Special No. 2 naturally appealed to underground miners also. They are used successfully in some underground mines, but their fumes make them unsuitable for others.

The newly developed Hercules Special No. 3, according to its manufacturers, has all the advantages of Special No. 1 and No. 2 with better fumes. It makes it possible to reduce costs underground to the same extent that Specials No. 1 and No. 2 reduce costs in the open.

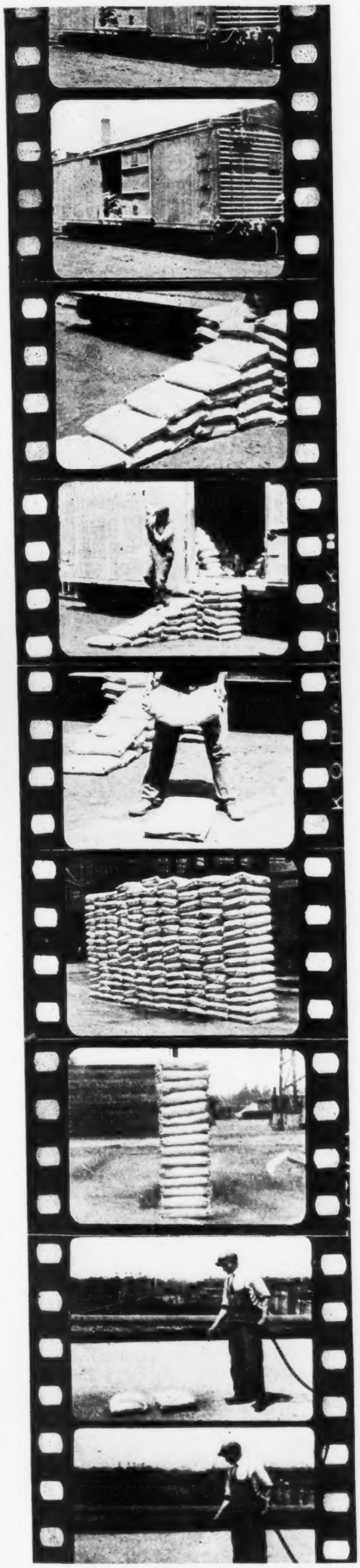
Development in Swing Hammer Mills

THE Dixie Machinery Manufacturing Co., St. Louis, Mo., has placed on the market an improved swing hammer mill especially designed to crush sticky, or muddy rock. It was designed by Edward H. Frickey, who has been connected with hammer-mill manufacture for 35 years.

Before placing the new mill on the market it has been given a year's tryout under every conceivable condition at one of the large portland cement plants. The new mill is made in all sizes.



Hammer mill designed for sticky materials



Picture No. 1—Carload of cement shipped in Bates five-wall paper sacks, arriving at dealer's yard to be removed to warehouse

Picture No. 2—An impromptu stairs of filled Bates sacks, actually piled up in a dealer's yard and used for convenience in unloading cement from car shipped in multi-wall paper containers

Picture No. 3—Dealer using the Bates bag 'stairway" in unloading sacks to nearby stock piles

Picture No. 4—Unique test of Bates container. This filled multi-wall sack was dropped forty-seven times across a filled bag before it finally did burst open

Picture No. 5—Novel object lesson in Bates paper-sacked cement storage. Easily piled fifteen bags high without any damage to a single sack. It is not necessary to stack bags cross-wise

Picture No. 6—End view of Bates sack storage, 15 bags high

Picture No.7 —Final and most convincing test of all. This hows the remarkable water test, under way. Two sacks of cement, one in cloth and the other in Bates multi-wall container were placed side by side on the roof and water in a continuous stream sprinkled over the bags uniformly for sixty minutes. After forty-eight hours, the cement in the cloth bag was found to be as hard as stone, while the exactly similar contents of the Bates sack were as fluffy and powdery as when first put in the container

Multi-Wall Paper Bags

BY MEANS of an intensive campaign among dealers the Bates Valve Bag Co., Chicago, Ill., is creating a big demand for cement shipments in non-returnable multi-wall paper valve bags. Of course the paper valve bag for portland cement is not a new idea, but previous experience with ordinary paper sacks has not always been favorable to its adoption. The thing that dealers and users have to be sold on is that the strength of the package is sufficient to stand rough usage. To accomplish this purpose the Bates Valve Bag Co. is making use of a 1000-ft. movie film which is very effective.

The opening scene shows a letter written by a cement manufacturer to a dealer in which a consignment of cloth bags is rejected because of their poor condition to serve further as containers.

The dealer follows this letter up by writing his contractor, explaining why he cannot allow rebate on sacks rejected by the manufacturer. The contractor - customer's reply is the usual one, namely, that because of the everlasting fuss over the cloth bag difficulties he is going to go elsewhere, where the dealer will not refuse credit on return sacks.

From all these unprofitable negotiations, the dealer turns with relief when the possibilities of the Bates multi-wall bag are explained to him.

He sees with his own eyes the dissecting of one of these Bates bags, whereby with the top and bottom of bag removed five distinct bags, one after another, are separated from the original multi-wall container.

Then comes a series of unique tests that prove the quality of the Bates container.

Upon the screen is shown the arrival of a carload of cement sacked in the Bates bags.

In order to speed up the unloading, yard men, having no unloading platforms, coolly throw out a dozen or two of the filled Bates sacks and construct an impromptu, though perfectly serviceable approach from the ground to the car floor, over which the rest of the carload is quickly taken to storage.

The rest of the story is told by the accompanying extracts from the film.

The significant fact about this reel is that it is no mere figment of the imagination. Every particle of it in an actual, ocular proof of the quality and durability of the container which it illustrates.

A number of these films are being made ready immediately for the use of associations and groups of dealers, manufacturers or others.

American Cable Co., New York, N. Y., manufacturers of Tru-lay wire rope and Tru-loc fittings have appointed the following new distributors for their product: Scotland—Bruntons Co., Musselburgh, Scotland. Canada—Dominion Wire Rope Co., Montreal. Indiana—Marion Machine, Foundry and Supply Co., Marion. New York—J. Shuman Hower, 106 Foster Bldg., Utica, N. Y., and Contractors Equipment Co., 8 Steuben St., Albany, N. Y. Maryland—John C. Louis, 221 S. Eutaw St., Baltimore.

Rates on Sand, Gravel, Crushed Stone and Slag in Central States Territory

Compiled for the National Sand and Gravel Association, Washington, D. C.

By Edwin Brooker
Commerce Counsel, Washington, D. C.

THE matter of freight rates on sand, gravel and competitive commodities is always an important subject to producers of these materials, inasmuch as the relationship, as well as the level of the rates to a great extent, controls the marketing of these commodities.

We are now passing through a period which promises important developments in the future level of rates on these materials in Western Pennsylvania and New York, Ohio, Indiana and Illinois, and possibly Michigan, so that a review of the existing basis and a survey of the proposed changes is presented herewith for the information of shippers in those states.

In years gone by the carriers looked upon the production of sand and gravel as a minor industry. They did not hesitate to reduce a rate where business was in sight. They were concerned not so much with revenue, but with tonnage. This resulted in the establishment of lower rates between points where these conditions prevailed and higher rates between other points in the same vicinity, where commercial necessity required no changes.

In the last twelve years rates on sand and gravel have generally been increased 5%, 15%, 20 cents per ton, and finally in 1920, 40%. Under these increases a rate of 30 cents in the year 1914 became 84 cents in the year 1920, an increase of 180%. The addition of 20 cents per ton in 1918 to short haul rates, and sand and gravel is a short haul commodity, pyramided by the 40% increase in 1920, placed an undue burden on this class of traffic between points to and from which the business moved. Of course, since 1920 we have had some reductions in the rates. During the year 1921 the railroads serving the state of Pennsylvania reduced freight rates 18% on sand, gravel, crushed stone and slag, placing the rates on basis of 115% of the rates in effect prior to the 40% increase. This was followed by a similar reduction in rates on these materials from Pennsylvania to Ohio.

The state of Michigan, by order of its Public Utilities Commission, then established the present level between points in Michigan. Ohio wiped out the 40% increase, and it was followed by a general reduction in state and interstate rates in other parts of central states territory to basis of 115% of the August 25, 1920, rates subject to the Michigan mileage scale as a minimum. The general reduction of 10% of July 1, 1922, further revised the rates which had not been reduced to equal a reduction of 10%, so as to reflect a full 10% reduction.

> ***THIS problem of railway freight rates is indeed important, and it has assumed national significance through recent developments.***
>
> ***I have urged our members to inform themselves of pending dockets before the Interstate Commerce Commission which affect each of them in some measure. Of course, at this time the most pressing problem is the proposal of carriers in western territory to place a flat increase of 7 1/2 cents on sand, gravel and stone. This immediate case is now being considered by our Association and appropriate steps will be taken.—T. P. Barrows, Executive Secretary of the National Sand and Gravel Association.***

With the increases since 1914 there came a changed attitude of the railroads. Instead of tonnage being their chief concern, it became revenue. They then and do now take all steps possible to prevent reductions in the rates on these materials, with the result that there have been several hard fought cases before the Interstate Commerce Commission and the state commissions.

In order that the situation covering the present level may be more clearly analyzed, a statement has been prepared showing the present level of rates where they can be reasonably ascertained.

Column 1 of this statement shows the Michigan mileage scale which is generally the basis of the rates between points in Michigan on sand, gravel, crushed stone and slag. You will note the basis starts with 50 cents for 10 miles and ranges upward to a 95-cent rate for 100 miles.

This scale, as previously stated, is generally used as the basis for publication of rates on our commodities between points in Michigan and was promulgated by the Michigan Public Utilities Commission by its order No. D-1522, June 17, 1922. There are some rates on a lower level, but the instances are few and exist only because the Michigan commission specified in their order that lower commodity rates should not be increased to the basis of the scale.

There have been two cases before the Indiana Public Service Commission during the last year or so which have resulted in the establishment of a mileage scale basis. This scale is outlined in Column 2 of the statement. This mileage scale of the Indiana commission may then be taken as the views of that commission on the level of rates to apply between points in that state. A comparison of existing commodity rates in Indiana with this mileage scale from individual plants will disclose whether present rates are higher than this basis, and if they are, no doubt revisions could be secured down to the mileage scale basis.

In Michigan 12 cents per ton, and in Indiana 10 cents per ton is added for two-line hauls.

The only general basis we have for determining the level of rates in Ohio is the scale of average weighted rates on sand and gravel introduced by the carriers in Docket 14252 (85 I. C. C. 66), a proceeding before the Interstate Commerce Commission in which the railroads attempted, without success, to overturn the action of the state commission by which they wiped out the 40% increase in rates.

This average weighted scale is compiled from actual shipments moving during a stipulated period, and I have shown this scale on the statement under Column 3. You will note it commences with 56 cents for five miles and varies up to 94 cents for 100 miles.

The trouble with an average weighted scale is that it reflects the average rates on actual improvements during a specified time, whereas if another test was made at some other time it might show other results, as

sand and gravel does not always move between the same points or at the same rates for the same mileage. It being the only official record available, however, I think it fair to use it in a comparison with other rates.

There is in effect in Ohio a mileage scale on slag which originally was established by the Ohio commission but later revised at the time of the 10% reduction in all rates. This Ohio state scale on slag is shown in Column 4 of the statement and, as you will note, is considerably lower than sand and gravel on the shorter hauls.

The situation generally in Ohio is that the freight rates on slag are lower than rates on sand and gravel for all distances.

Competition with slag in Ohio and Western Pennsylvania has become acute. In Ohio there are 45 furnaces and in Western Pennsylvania 21 furnaces producing commercial slag. During the year 1923 a total of 525,000 tons of slag were sold from two slag plants, 300,000 tons from the National Tube Co. plant at Lorain, and 225,000 from the Ohio works plant of the Carnegie Steel Co. at Youngstown. Adding to this amount the sales of the remaining 43 furnaces, and you can get some idea of the extensive use of slag.

The Western Pennsylvania producers of sand and gravel are now on the last lap of litigation before the Interstate Commerce Commission, in which the preferential rates on slag has been the main point of attack. The examiner's report, in effect, recommends the same level of rates on all road-building commodities and also recommends a mileage scale of rates to apply on interstate traffic from Western Pennsylvania to Ohio, New York and West Virginia. The proceeding is known as Docket 15329, on which oral argument has been completed and final decision will be given shortly.

In order that a clear vision may be had of the present level of interstate rates on sand, gravel and slag in Western Pennsylvania, the range of the existing rates on sand and gravel are shown in Column 5, and the slag milege scale is shown in Column 6. The minimum and maximum sand and gravel rates are shown for the various distances.

The examiner's proposed interstate scale from Western Pennsylvania to Ohio, etc., is shown in Column 7 and a comparison with present sand and gravel rates as well as slag rates as shown in Columns 5 and 6 will reveal decided reductions.

Effective January 1, 1925, new tariffs were issued, materially increasing the rates from Western Indiana plants to Illinois on sand, gravel and crushed stone. The producers secured a suspension of the effective date of these increases by the state and Interstate Commerce Commission. The matter was handled under I. C. C. I. & S. Docket Nos. 2306 and 2307, and a hearing held which lasted five days. The situation was so complicated that no two shippers or railroads thought alike on the basis which should apply, so that finally shippers, railroads and representatives of the commission, sat around a conference table to iron out the differences existing, with the result that specific rates on a very favorable basis for shippers have been agreed upon for application in the future. The rates checked recognize competition more than mileage.

The question of harmonizing state and interstate rates as well as the question of an equalization of the rates on sand, gravel, crushed stone and slag, need careful consideration by producers, as they will both be very prominent in the near future.

PRESENT LEVELS OF RATES ON SAND AND GRAVEL IN OHIO, INDIANA AND MICHIGAN AND A COMPARISON OF PRESENT AND PROPOSED RATES FROM WESTERN PENNSLVANIA

Column	1	2	3	4	5		6	7
			Ohio		Western Pennsylvania			Examiners Scale
			Sand		Sand and Gravel			
Miles	Michigan	Indiana	Gravel	Slag	Min.	Max.	Slag	Docket 15329
5	50	60	56	40	70	88	45	60
10	50	60	60.5	40	70	88	45	60
15	54	60	60 5	40	70	88	45	60
20	58	60	58	50	70	90	60	60
25	62	65	65.5	50	70	90	60	70
30	66	65	69	60	80	105	70	70
35	70	70	73	60	80	125	70	70
40	70	70	71.5	60	80	125	70	70
45	75	75	80	80	90	125	90	80
50	75	75	81.5	80	90	125	90	80
55	80	80	78.5	80	90	140	90	80
60	80	80	80	90	90	140	105	80
65	85	85	81	90	90	140	105	90
70	85	85	88.5	90	105	150	105	90
75	90	90	92.5	90	105	150	105	90
80	90	90	85.5	100	105	150	115	90
85	90	95	82	100	105	150	115	100
90	95	95	95	110	115	160	125	100
95	95	100	85	110	115	160	125	100
100	95	100	94	110	115	160	125	100

Every Part of Country Affected by Cases Now Before I. C. C.

ONE question which has forged rapidly to the front in the last few months and which has assumed national significance is that of adjustment of freight rates on all commodities handled by the railroads. The situation might be summarized as follows:

NATIONAL INVESTIGATION: Under Docket No. 17,000, the Interstate Commerce Commission, pursuant to the Hoch-Smith Resolution approved by Congress on January 3, 1925, is conducting a general investigation of all rates on all commodities transported by common carriers subject to the act to regulate commerce. The purpose of this investigation, according to an announcement from the Commission, is to "comply with the joint resolution in order to determine the extent and manner in which the rate structure of common carriers subject to the interstate commerce act is in any respect unlawful, and to make in accordance with law such changes, adjustments, and redistribution in that rate structure as may be necessary to correct any defects found to exist." It is evident that the Commission may either increase or decrease rates as a result of its findings.

EASTERN TERRITORY: Under Docket No. 15,879, the Interstate Commerce Commission is investigating class rates on all commodities in Eastern Territory in order to "provide for a more scientific basis of rates." This may mean increases or decreases on sand and gravel traffic.

SOUTHERN TERRITORY: The railroads in Southern Territory have published tariffs naming rates on sand, gravel, stone, and slag from Alabama points to Georgia destinations which make changes in present rates. This is conceded generally to be the forerunner of attempts by the carriers to change existing rates on the commodities named in all parts of Southern Territory.

WESTERN TERRITORY: The Interstate Commerce Commission has ordered the railroads operating west of Chicago to prepare themselves for the presentation of data as to their revenues and traffic, to be submitted at hearings conducted by Commissioner Aitchison in Chicago beginning September 8. Shippers and communities concerned have been notified of their opportunity to cross-examine. The carriers are expected to demand rate increases.

Thus it may be seen that the whole country is affected by questions which are now before the Interstate Commerce Commission for decision.—The National Sand and Gravel Bulletin.

Program for Chicago Freight Rate Hearing

THE Interstate Commerce Commission has made public a letter received by Chairman Aitchison from R. N. VanDoren, speaking for western carriers, in which the carriers' program for the presentation of evidence at the hearings in 17,000 and Ex Parte 87, beginning September 8, is outlined. The revenue needs of the carriers will be taken up first. This will be followed by testimony of railroad executives. Traffic witnesses will then submit the western carriers' rate plan. Some testimony will be submitted by individual carriers. Mr. VanDoren said the law committee of the carriers estimated that it would require from September 8 to 18, inclusive, for the presentation of the carriers' case, but that the estimate was only an approximation.

Announcement by the Commission in No. 17,000, rate structure investigation, and Ex Parte 87, revenues in western district, as to procedure at the initial hearing in Chicago, September 8, revealed that decision had been reached to hold local hearings "at other places more convenient than Chicago for many of the parties concerned." The notice also contained a suggestion to those having local situations to complain of to bring them before the Commission by appropriate complaint apart from the general proceedings in No. 17000 and Ex Parte 87. The Commission's notice follows:

In a notice to the public dated July 10, 1925, the above proceedings were assigned for hearing before Chairman Aitchison at the Edgewater Beach Hotel, at Chicago, Ill., beginning September 1, 1925. The assignment has been changed to Tuesday, September 8, at 10 a. m., central standard time.

That notice stated that the carriers would be expected to submit as far as possible their complete proposals and evidence, and that parties other than the carriers should advise the commission on or before August 10, whether they desire to introduce evidence at the first hearing should time permit.

Few requests have been received for such opportunity. It now develops that owing to the limited time available for the first hearing the probability is that there will be no opportunity at the initial hearing for the presentation of direct evidence by shippers and the public generally. Accordingly, it has been determined that, following the carriers' presentations and that of associations of security holders or similar organizations, together with such limited cross-examination as may be appropriate that that time and the disposition of such pertinent general matters as may arise, including those concerning future procedure and the nature of evidence to be developed, an adjournment will be taken for a convenient interval. This course, which has been found successful in other general rate investigations, is necessary and desirable in the interest of orderly and concise cross-examination. At subsequent hearings, the dates and places of which will be later announced, opportunity for further cross-examination of the witnesses appearing at the first hearing will be afforded, and evidence will be received from other parties. The expectation is that at adjourned hearings, to be held at other places more convenient than Chicago for many of the parties concerned, better opportunity can be afforded for the production of testimony of more local character.

It is understood that the carriers have filed with the State commissions in the western district, petitions for increases in revenue similar to those filed with this commission in Ex Parte 87. A committee of representatives of State commissions will co-operate with this commission in No. 17000, which will be heard concurrently with Ex Parte 87. It is assumed that at the coming hearing the members of that committee from the western district will also co-operate in Ex Parte 87.

Particular attention of all parties is called to the requirements of Rule XIII of the Rules of Practice relating to the preparation and presentation of exhibits, a copy of which is annexed. We expect the co-operation and assistance of all concerned in the observance of the rule. Twenty copies of each exhibit are desired for this commission, one copy for each State commission in the western district, and one copy for each representative of a State commission sitting with this commission at the hearings, in addition to sufficient copies to supply interested parties appearing at the hearings.

In addition to the statistical information called for in the notice of July 10 the carriers are requested, as far as possible, to furnish in exhibit form, and at the hearing commencing September 8, if possible, a statement showing for the year 1924—

(a) Mileage operated by each Class 1 railroad in the respective states in the western district.

(b) The operating revenues, classified, received by each of said railroads in the respective states in which they operate, divided between intrastate and intrastate traffic.

(c) A statement of the operating expenses classified as to the five major accounts incurred by each of said railroads in the respective states in which they operate in the western district.

(d) Total tons, and tons 1 mile, handled by each of said railroads in each of the respective states in which they operate in the western district.

If all the statistics above specified are not now available, such statistics of the same general character as are available should be furnished.

While the order of investigation in No. 17000 covers all rates and practices of carriers, in proceedings such as No. 17000 and Ex Parte 87 there are important general issues which should receive attention before matters of interest only to a few, such as questions of alleged discrimination or prejudice between particular shippers or points. Accordingly, all parties are requested not to present evidence with respect to such local situations unless, and until, advised that the commission is ready to proceed with such matters in these general proceedings. Parties having such situations which they desire to present more speedily are not precluded by these proceedings from submitting them by appropriate complaint, whether now pending or hereafter brought.

The American Mining Congress has issued the following statement:

Protest against increased freight rates by western railroads on products of mines and materials used by mines will be made by the Arizona and Utah Chapters of the American Mining Congress at the opening hearing at Chicago, September 8, by the Interstate Commerce Commission under the Hoch-Smith law authorizing a general freight rate readjustment. It is also probable that mining interests of other western states will add their opposition. The mining men consider that mine products already bear a sufficiently heavy transportation burden, and feel that with lower rates the prosperity of mining would be aided and the earnings of railroads increased by reason of increased shipments.—*Traffic World.*

Universal Portland Cement Elects New Officers

THE names of new officers to fill the vacancy caused by the recent death of T. J. Hyman, former secretary and treasurer of the Universal Portland Cement Co., Chicago, Ill., were announced by B. F. Affleck, president of the company, following a meeting of the board of directors: The new officers are:

E. B. Harkness, secretary; A. W. Carlisle, treasurer; and O. N. Lindahl, assistant secretary, which office he will occupy in addition to the office of auditor.

Warrior Cement Corporation Improves Demopolis Plant

THE Warrior Cement Corp. of Chattanooga, Tenn., has placed contracts with Allis-Chalmers Co. of Milwaukee, Wis., for the first installment of new equipment to be used in rebuilding the plant of the Warrior corporation at Demopolis, Ala. The new equipment includes two 10x150-ft. rotary kilns, three 7x26-ft. compeb mills, three 500-hp. synchronous motors and a number of smaller motors and electrical equipment.

W. Jess Brown Appointed New Southern Sales Manager for Lehigh Cement

W. JESS BROWN has been appointed Southern sales manager of the Lehigh Portland Cement Co. to succeed Frank Traynor, who has resigned to become general manager of I. E. Schilling and Co. of Miami.

The appointment is effective September 1, at which time Traynor is to leave.

Mr. Brown has been with the Southern office of the Lehigh company in Birmingham since February 1, 1924, as assistant sales manager.

From January, 1921, until that time he was sales manager of the National Cement Co. and the Georgia Cement and Stone Co.

Mr. Brown entered the cement industry in 1907 as chemist for the United Kansas Portland Cement Co. Later he was with the Dixie Portland and the Edison Portland.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Concrete Pipe Plant of Grant Whitmore Company, Oxford, Michigan

A Cement Products Industry That Takes Advantage of a Big Sand and Gravel Producing Territory

OXFORD, Mich., is well known as the center of a great sand and gravel industry. It would be natural to find a considerable development of the concrete products industries in such a place, but the block business, which is always more or less local in its nature, could hardly find much of a market in a town of 1600. One small block plant with hand-power machines supplies the local demand.

But concrete pipe is another story. Pipe have to be shipped a considerable distance wherever they are made, as the great use for them today is in connection with street and highway work. So Oxford has two pipe plants and the product is sold to counties and municipalities, some of them quite distant from the town.

One of these is the plant of the Grant Whitmore Co. which is in the village of Oxford and near the railroad by which a good part of its product is shipped. It makes all sizes of pipes from 8-in. to 48-in. and practically all of its product goes into public works.

There are two ways of making pipe of concrete. One is to set up the steel molds with the reinforcing, which has been welded in the form of a cylinder of network between, and pour from the top. The other method is to set up the molds without reinforcing and ram them with a mixture which is much too dry to be poured, adding the reinforcement in the form of wire rings as the work proceeds. This is the method employed at the Whitmore plant. Both methods make good pipe, but Mr. Whitmore believes he gets a better pipe by ramming a dry mixture than he would by pouring.

The molds are of steel plate with castings at the top and bottom to mold the male and female parts of the union. The male portion forms the base on which the steel plate forms are locked. Originally

Grant Whitmore, president of the company which bears his name

Sample pipe—Note clean edge and smooth interior surface

the female portion was used but it was found that more pipes were damaged in the process of making than if the male portion was used. The casting is placed on the floor and more or less levelled by placing blocks under it. Then the forms are locked and the concrete put into make a layer of an inch or two, which is rammed hard by hand. Successive layers follow and are each rammed after the reinforcing has been put in.

The mix is damp enough to retain its shape well when it is squeezed in the hand. As in other concrete products, it is found that a mix of the proper plasticity has the correct moisture for the setting and hardening of the cement.

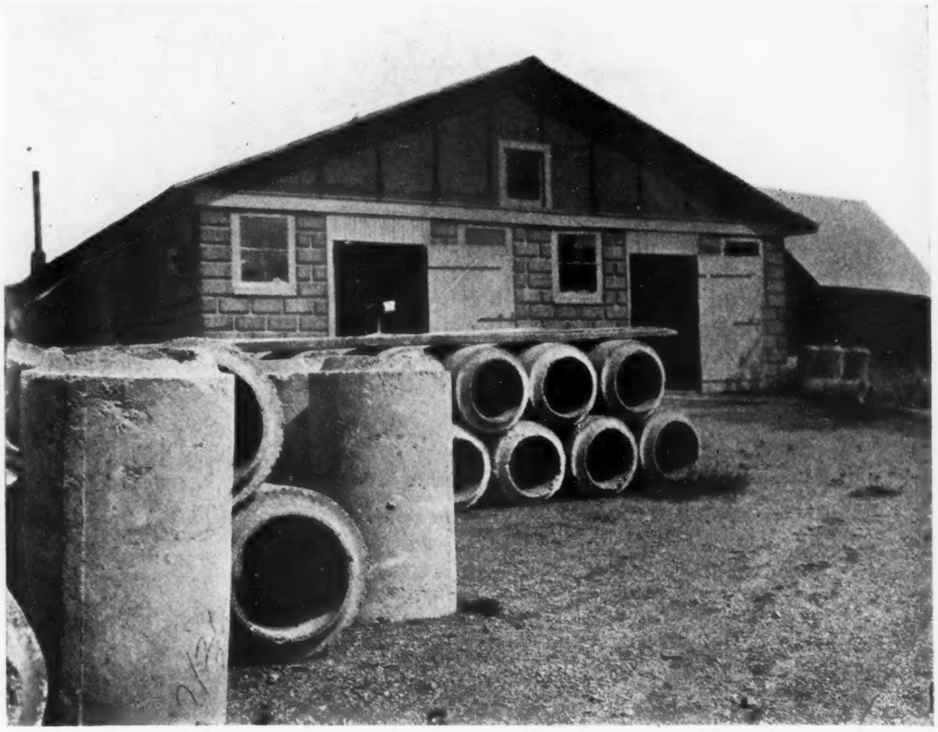
The mixer is one designed by Mr. Whitmore and it is a simple but effective machine. It consists of a trough in which a 4-in. pipe is revolved by a motor. On the outside of the pipe are fins or blades made of flat steel. These are twisted to give a forward motion to the material. The sand, pebbles and cement are put into a hopper at the end and fed through a gate into the trough in which they receive a thorough mixing as they pass to the discharge end. Water is added from a pipe at the hopper, the moisture being regulated by the "feel" of the mix.

The mixed concrete is wheeled to the mold into which it is fed by a shovel. The workman tamps each layer by a rod on which is a fairly heavy casting which fits between the inner and outer molds.

The aggregate is 70% washed sand and 30% washed pebbles between ¾ in. and ¼ in. and one part of cement by volume is used to three parts of aggregate. This is a much richer mixture than is used for concrete blocks, but the pipe has to be strong, especially where it is used as the culvert in a road. Tests on these pipe show that they will stand a pressure of 3700 lb. per lineal foot.

The molds can be removed as soon as the pipe is made but the blocks stand on the castings for a day or so before they are sent to the yards for final curing. They are strong enough then so that they can be laid on the side and rolled, the only precaution necessary being that of laying boards or planks where the ground is rough.

Pipe from 8-in. to 36-in. are kept in stock so that they can be shipped as soon as an order is received. The larger sizes up to 48-in. are made on order.



Pipe plant of the Grant Whitmore Co., Oxford, Mich.

Interior of plant showing newly cast pipe curing

New Design of Concrete Poles Eliminates Maintenance Cost

A DESIGN of concrete poles which successfully copes with the problem of the growing scarcity of timber and meets the demands for longer life, greater strength and increased safety factors in telegraph, trolley and transmission lines, is that incorporated in the Hollowspun concrete poles manufactured by the Westinghouse Electric and Manufacturing Co.

The Hollowspun concrete poles are very permanent in nature since they are not subject to the action of ordinary weather elements. Water tends to harden concrete, and can not affect the reinforcing steel since it is embedded in the pole and is, therefore, inaccessible to the water or air. The Hollowspun poles, built by a centrifugal process, are free from electrolytic corrosion due to the density of the concrete.

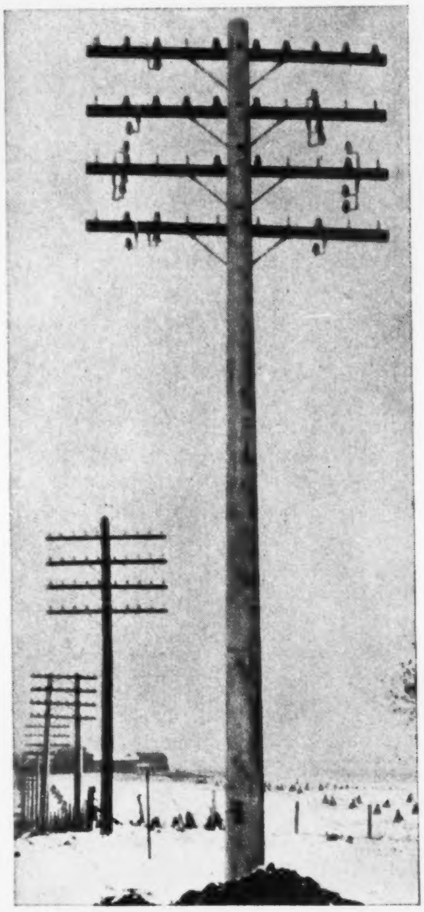
Reinforced concrete pole construction requires a relatively high per cently of tensile and shear reinforcement. In order to obtain this, the section of the individual rods must be kept down and these are then given some additional horizontal wrapping to insure against shear failure. The resulting mass of reinforcement commonly called a cage is so dense that it is not possible to force concrete into place by spading or tramping.

In the Hollowspun process, the reinforcing steel, after being accurately computed for the particular class of pole to be made, is held rigidly in place.

The complete reinforcing cage is then placed in a horizontal form and held at the desired distance from the surface of the form by concrete buttons which become part of the finished wall of the pole. Concrete is added and the entire form rotated at high speed, developing centrifugal force sufficient to compact the concrete into a very dense wall, leaving a cylindrical opening in the center running through the length of the pole.

Removable steps may be made for these concrete poles by embedding bronze inserts in the concrete and using these as inserts for holding the ordinary pole steps. Standard cross arms and other equipment now in use can also be applied to these Hollowspun poles.

The use of these concrete poles for telegraph and transmission lines makes possible a considerable increase in the capacity of the lines, and thus permits the reduction of the number of poles per mile, or an increase in the number of wires without reducing the factor of safety.



Hollowspun telephone poles in service under severe weather conditions

Massachusetts Men Establish Cement Products Plant

TWENTY acres of land adjacent to Hockomocko Pond have been purchased by the Kelbay Corporation of Massachusetts which will establish and operate a cement manufacturing plant at Westboro, Mass. The purchase includes the large gravel pit long used by the Boston & Albany R. R.

H. D. Atkin, a director of the corporation, who obtained the Massachusetts franchise from the parent company, which operates in five states, said that the facilities for the manufacture of cement products are excellent. The gravel pit is part of a long, high ridge which provides large quantities of raw material.

The company will erect buildings and install equipment at an estimated cost of $55,-000, Mr. Atkins said, and will employ from 30 to 40 men. One of the buildings will be three stories in height and there will be dry kilns, steam kilns and lesser structures.

Products of the company will be cement blocks, bricks, tile, lintels and other building materials. Manufacture will be by automatic machines.

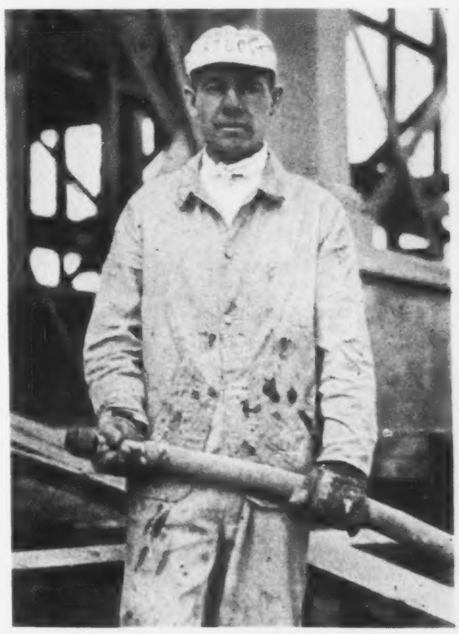
Crushers of large capacity will take the raw material direct from the pit. There are extensive railroad sidings and a large area of level land at the location.—*Worcester (Mass.) Post.*

Applying Concrete by Compressed Air

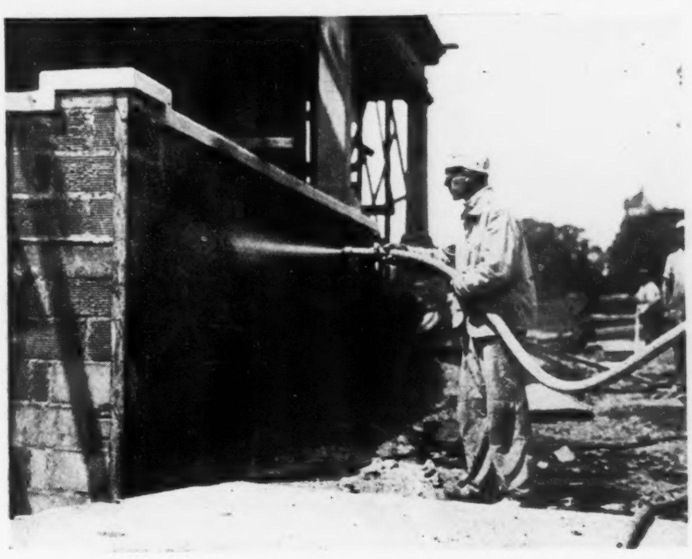
THE application of concrete by compressed air is a method which is increasing in use. Originally applied to the lining of tunnels and similar work, it has now many uses such as repairing old concrete work that has been damaged, the protection of many kinds of surfaces and even the building of walls.

The pictures show a machine recently invented by N. Bernier of Cambridge, Mass., for doing this work. The materials are mixed in a regular concrete mixer and emptied into a pressure tank. A pressure of 80 lb. is applied which forces the concrete through the hose and against the surface to be covered.

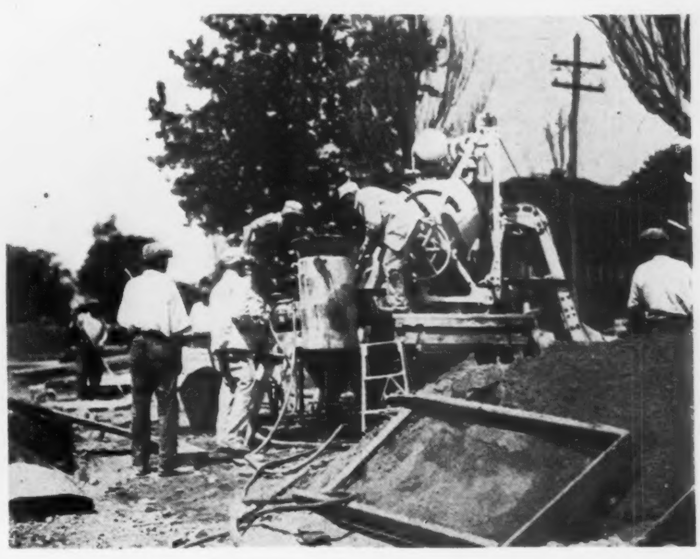
It is said that a man can apply 100 sq. ft. of base coat in a minute, the leveling being done by plastering tools.



Hose and nozzle used for applying concrete (all Keystone views)



Applying concrete with hose and compressed air



Concrete mixer and air compressor required for new process

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	1.00	....	1.75	1.50	1.50	1.50
Eastern Pennsylvania	[illegible]	1.35	1.45	1.35	1.35	1.35
Munns, N. Y.	1.00	1.40	1.40	1.30	1.30	....
Northern New Jersey	1.60	1.50@1.80	1.80@2.00	1.40@1.60	1.40@1.60	....
Prospect, N. Y.	1.00	1.40	1.40	1.30	1.30	....
Walford, Penn.	1.00	1.30	....	1.50h	1.50h	....
Watertown, N. Y.	.50	....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alton, Ill.	1.85	....	1.85	1.50	....	....
Bloomville, Middlepoint, Dunkirk, Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio; Monroe, Mich.; Huntington, Bluffton, Ind.	1.00	1.10	1.10	1.00	1.00	1.00
Buffalo and Linwood, Iowa	1.00	....	1.15	.95	1.00	1.00
Chicago, Ill.	.80	1.00	1.00	1.00	1.00	1.00
Columbia, Krause, Valmeyer, Ill.	1.00@1.75	1.20	1.20	1.20	1.20	1.40
			Flux all at 1.30			
Cypress, Ill.	1.25	1.15	1.10	1.10	1.10	1.10
Dundas, Ont.	.70	.90	.90	.90	.90	.90
Gary, Ill.	1.00	1.37½	1.37½	1.37½	1.37½	1.37½
Greencastle, Ind.	1.25	1.25	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.05	1.05	.95	.95	.95
Northern New Jersey	1.30	....	1.80	1.60	1.40	....
River Rouge, Mich.	1.00	1.10	1.10	1.10	1.10	1.10
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
St. Vincent de Paul, Que.	.85	1.35	1.05	.95	.90	.90
Stone City, Iowa	.75	....	1.20	1.10	....	....
Toronto, Ont.	1.60	1.95	1.80	1.80	1.80	1.80
Waukesha, Wis.	.90	.90	.90	.90	.90	....
Wisconsin Points	.50	....	1.00@1.15	.90@1.05	.90@1.05	....
SOUTHERN:						
Alderson, W. Va.	.60	1.60	1.60	1.50	1.40	....
Allgood, Ala.		Crusher run, fines out, for flux, 1.00 per net ton				
Cartersville, Ga.	1.50	1.50	1.50	1.15	1.15	....
Chico, Texas	1.00	1.40	1.35	1.25	1.20	1.10
El Paso, Texas	1.00	1.00	1.00	1.00	....	....
Ft. Springs, W. Va.	.60	1.60	1.60	1.50	1.40	....
Graystone, Ala.		Crusher run fluxing stone, 1.00 per net ton				
Olive Hill, Ky.	.50@1.00‡	1.00	1.00	1.00	1.00	1.00
Rockwood, Ala.	.90	....	....	....	1.00	.90
Rocky Point, Va.	.50@1.00	1.40@1.60	1.30@1.40	1.15@1.35	1.10@1.20	1.00@1.05
WESTERN:						
Atchison, Kans.	.25	2.00	2.00	2.00	2.00	1.60‖@1.80
Blue Spr'gs & Wymore, Neb.	.20	1.45	1.45'	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.25	....	1.25	1.25	1.00	....
Kansas City, Mo.	1.00	1.80	1.80	1.80	1.80	1.80
Rock Hill, St. Louis Co., Mo.	1.25	1.35	1.35	1.35	1.35	1.25

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.70	1.45	1.20	1.05	....
Duluth, Minn.	.90	2.25	1.90	1.50	1.35	1.35
Dwight, Calif.	1.75	1.75	1.75	1.75	1.75	....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
New Haven, New Britain, Meriden & Wallingford, Conn.	.80	1.70	1.45	1.20	1.05	1.05
Northern New Jersey	1.50e	2.00	1.80	1.40	1.40	....
Oakland and El Cerritto, Calif.	1.00	1.00	1.00	.90	.90	....
San Diego, Calif.	.70e	1.80f	1.60	1.40g	1.30	....
Sheboygan, Wis.	1.00	1.10	1.10	1.10	1.10	....
Springfield, N. J.	2.00	2.10	2.10	1.70	1.70	1.70
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	1.10

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley and Red Granite, Wis.—Granite	1.50	1.60	1.35	1.25	1.25	1.00
Coldwater, N. Y.—Dolomite			1.50 all sizes			
Columbia, S. C.—Granite	.50	1.75	1.75	....	1.60	
Eastern Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Lithonia, Ga.	.75	1.75	1.60	1.25	1.25	....
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	....
Middlebrook, Mo.—Granite	3.00@3.50	....	2.00@2.25	2.00@2.25	....	1.25@2.00
Northern New Jersey (Basalt)	150	2.00	1.80	1.40	1.40	....
Richmond, Calif. (Basalt)	.75*	....	1.50*	1.50*	1.50*	....

*Cubic yd. †1 in. and less. ‡Two grades. ‖Rip rap per ton. (a) Sand. (b) to ¼ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Dust. (f) ¼-in. (h) less 10c discount. (i) 1-in., 1.40.

Agricultural Limestone
(Pulverized)

Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 90% thru 100 mesh		6.00
50% thru 4 mesh		3.00
Asheville, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk		2.75
Branchton and Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)		5.00
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; pulverized; 50% thru 50 mesh		1.50
Cartersville, Ga.—Analysis 68% $CaCO_3$, 32% $MgCO_3$; pulverized		3.00
50% thru 50 mesh		1.50
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk		2.50
Chico, Texas—90% thru 100 mesh		4.50
50% thru 100 mesh		3.50
90% thru 50 mesh		3.00
50% thru 50 mesh		2.50
90% thru 4 mesh		1.50
50% thru 4 mesh		1.25
Colton, Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk		4.00
Danbury, Conn., Rockdale and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$, 5% $MgCO_3$; 50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk		3.25
Dundas, Ont., Can.—Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$; 35% thru 100 mesh, 50% thru 50 mesh, 100% thru 10 mesh; bags, 4.75; bulk		3.00
Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; sacked		5.00
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk		2.50
Knoxville, Tenn.—Analysis, 52% $CaCO_3$, 37% $MgCO_3$; 80% thru 100 mesh; bags, 3.95; bulk		2.70
Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk		2.75
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.10; bulk		3.60
Marion, Va.—Analysis, 90% $CaCO_3$, guaranteed; 42.5% thru 100 mesh, 11.3% thru 80, 20.2% thru 60, 22.8% thru 40, 3.2% thru 20 and under or 75% thru 40 mesh; pulverized, per ton		2.00
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 90% thru 100 mesh	3.90@	4.50
Mountville, Va.—Analysis 76.60% $CaCO_3$, 22.83% $MgCO_3$; 50% thru 100 mesh, 100% thru 20 mesh—125-lb. hemp bags		5.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100	2.50@	2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk		3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk		5.50
Rocky Point, Va.—Analysis, 95% $CaCO_3$; 50% thru 200 mesh	1.75@	2.00
Asphalt filler dust, 80% thru 200 mesh	3.00@	3.50
Waukesha, Wis.—90% thru 100 mesh		3.70
Watertown, N. Y.—Analysis 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk		2.50
West Rutland, Vt.—90% thru 100 mesh; 7.00 in bags; bulk		4.50
West Stockbridge, Mass.—Pulverized; paper bags, 4.10; cloth, 4.60; bulk		2.85

Agricultural Limestone
(Crushed)

Alderson, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh		1.50
Atlas, Ky.—Analysis over 90% $CaCO_3$; 90% thru 4 mesh	1.00@	2.00
Bedford, Ind.—Analysis, 98.5% $CaCO_3$, 0.5% $MgCO_3$; 90% thru 10 mesh		1.50
Bettendorf, Iowa—97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh		1.50
Blackwater, Mo.—Analysis, 99% $CaCO_3$; 90% thru 4 mesh	.60@	1.00

(Continued on next page)

Agricultural Limestone

(Continued from preceding page)

Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	1.75
50% thru 4 mesh	1.50
Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh	.80
Columbia, Krause, Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 90% thru 4 mesh	1.35
Cypress, Ill.—90% thru 100 mesh	1.25
50% thru 100 mesh, 90% thru 50 mesh, 50% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh	1.15
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Garrett, Okla.—All sizes	1.25
Gary, Ill. — Analysis, approx. 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh	.75
Kansas City, Mo. — 50% thru 100 mesh	1.25
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk	1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh	1.85@ 2.35
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind. — Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 25 to 45% thru 100 mesh	1.60
Milltown, Ind. — Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$; 30.8% thru 100 mesh, 38% thru 50 mesh	1.45@ 1.60
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Pixley, Mo.—Analysis, 96% $CACO_3$; 50% thru 50 mesh	1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh	1.65
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@ 1.40
Stone City, Iowa. — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Waukesha, Wis.—Test, 107.38% bone dry, 100% thru 10 mesh; bags, 2.85; bulk	2.10

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk	3.00
Piqua, Ohio, sacks, 4.50@5.00 bulk	3.00@ 3.50
Rocky Point, Va.—80% thru 200 mesh	3.00@ 3.50
Waukesha, Wis.—97% thru 100 mesh, bulk	4.00

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Glass Sand:	
Berkeley Springs, W. Va.—	2.00@ 2.25
Cedarville and S. Vineland, N. J.—Damp	1.75
Dry	2.25
Cheshire, Mass.: 6.00 to 7.00 per ton; bbl.	2.50
Columbus, Ohio	1.25
Estill Springs and Sewanee, Tenn.	1.50
Franklin, Penn.	2.00
Gray Summit and Klondike, Mo.	2.00
Los Angeles, Calif.—Washed	5.00
Mapleton Depot, Penn.	2.00@ 2.25
Massillon, Ohio	3.00
Mineral Ridge and Ohlton, Ohio	2.50
Oceanside, Calif.	3.00
Ottawa, Ill.—Chemical and mesh guaranteed	1.25
Pittsburgh, Penn.—Dry	4.00
Damp	3.00
Red Wing, Minn.: Bank run	1.50
Ridgway, Penn.	2.00
Rockwood, Mich.	2.75@ 3.25
Round Top, Md.	2.25
San Francisco, Calif.	4.00@ 5.00
St. Louis, Mo.	2.00
Sewanee, Tenn.	1.50
Thayers, Penn.	2.50
Utica, Ill.	1.00@ 1.15
Zanesville, Ohio	2.50
Miscellaneous Sands:	
Aetna, Ind.: Core, Box cars, net, .35; open-top cars	.30
Albany, N. Y.: Molding coarse	2.00
Molding fine, brass molding	2.25
Sand blast	3.75

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, f. o. b. producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. H'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Attica and Franklinville, N. Y.	.75	.75	.85	.75	.75	.75
Buffalo, N. Y.	1.10	.95			.85	
Erie, Penn.		1.25		1.50	1.75	
Farmingdale, N. J.	.58	.48	1.05	1.20	1.10	
Hartford, Conn.	.65*					
Machias Jct., N. Y.		.75	.75	.75	.75	.75
Montoursville, Penn.		1.10	1.10	1.00	.90	.90
Northern New Jersey	.50	.50	1.25	1.25	1.25	
Olean, N. Y.		.75	.75	.75	.75	.75
Shining Point, Penn.			1.00	1.00	1.00	1.00
South Heights, Penn.	1.25	1.25	.85	.85	.85	.85
Washington, D. C.	.60@ .85	.60@ .85				1.10@1.30
CENTRAL:						
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Attica, Covington and Summit Grove, Ind.	.60@ .85	.60@ .85	.75@ .85	.75@ .85	.75@ .85	.75@ .85
Barton, Wis.		.50	.75	.75	.75	.75
Boston, Mass.‡	1.60	1.60	2.50		2.25	2.00
Chicago, Ill.	1.20	1.10	1.10			1.00
Columbus, Ohio	.75	.75	.50	.75	.75	.75
Des Moines, Iowa	.50	.40	1.50	1.50	1.50	1.50
Eau Claire, Wis.	.40	.40	.80			.85
Elkhart Lake, Wis.	.60	.40	.50	.50	.50	.50
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Grand Rapids, Mich.	.50	.50		.80	.70	.70
Hamilton, Ohio		1.00			1.00	
Hersey, Mich.		.50				.70
Humboldt, Iowa		.85	2.00	2.00	2.00	
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Mason City, Iowa	.45@ .55	.45@ .55	1.35@1.45	1.45@1.55	1.40@1.50	1.35@1.45
Mankato, Minn., and Appleton		.40		1.25	1.25	1.25
Milwaukee, Wis.		1.01	1.21	1.21	1.21	1.21
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.45@ .50	.45@ .50		1.25	1.25	
Palestine, Ill.	.75	.75	.75	.75	.75	.75
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
St. Louis, Mo.	1.18	1.45	1.55	1.45	1.65	1.45c
Terre Haute, Ind.	.75	.60	.90	.90	.75	.75
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.25	1.10	1.10	1.00
Yorkville, Sheridan, Oregon, Moronts, Ill.		.40@ .70	.30@ .50	.50@ .60	.60	.60
Zanesville, Ohio	.70	.60	.60	.60	.90	
SOUTHERN:						
Charleston, W. Va.		All sand, 1.40.	All gravel, 1.50.			
Chehaw, Ala.	00@ .30	...	.40	.50		
Knoxville, Tenn.	75@1.00	75@1.00	1.20	1.20	1.20	1.00
Lindsay, Texas					.55	
Macon, Ga.		.50		.75	.85	
New Martinsville, W. Va.	1.00	.90@1.00		1.30		.80@ .90
Roseland, La.	.50	.50	2.00		1.00	
Smithville, Texas		.90	.90	.90	.90	.75
WESTERN:						
Baldwin Park, Calif.	.20	.20	.40	.50	.50	
Kansas City, Mo.	.80	.70				
Los Angeles, Calif.	.50	.50	.92	.92	.92	
Los Angeles district (bunkers)†	1.50	1.40	1.85	1.85	1.85	1.85
Phoenix, Ariz.	1.25*	1.00*	2.50*	2.00*@2.25*	1.75*	1.50*
Pueblo, Colo.	1.10*	.90*		1.60*		1.50*
San Diego, Calif.		.60	1.25	1.20	1.00	1.00
Seattle, Wash. (bunkers)	1.50*	1.50*	1.50*	1.50*	1.50*	1.50*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Chehaw, Ala.	00@ .30					
Chicago, Ill.	.95					
Des Moines, Iowa		Washed, .65; unwashed, .40 (not screened)				
Dudley, Ky. (crushed silica)	1.10	1.10	.90	.90		
East Hartford, Conn.			Sand, .75 per cu. yd.			
Elkhart Lake, Wis.	.50					
Gainesville, Texas		.95				.55
Grand Rapids, Mich.				.60		
Hamilton, Ohio					.70	
Hersey, Mich.				.55		
Indianapolis, Ind.		Mixed gravel for concrete work, .65				
Lindsay, Texas		1.10				.55
Macon, Ga.		.35				
Mankato, Minn.			Pit run sand, .50			
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Montezuma, Ind.						.60
St. Louis, Mo.			Mine run gravel 1.55 per ton			
Shining Point, Penn.			Concrete sand, 1.10 ton			
Smithville, Texas	.50	.50	.50	.50	.50	.50
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Winona, Minn.	.60	.60	.60	.60	.60	.60
York, Penn.	1.00	1.00				
Zanesville, Ohio						

(a) ¾-in. down. (b) River run. (c) 2½-in. and less.
*Cubic yd. †Include freight and bunkerage charges and truck haul. ‡Delivered on job.

Miscellaneous Sands

(Continued from preceding page)

Arenzville, Ill.:
- Core .75
- Molding fine 1.50@ 1.75

Beach City, Ohio:
- Core 1.75
- Furnace lining 2.50
- **Molding fine and coarse 2.00**
- **Traction unwashed and screened 1.75**

Cheshire, Mass.—Furnace lining, molding fine and coarse 5.00
- **Sand blast 5.00@ 8.00**
- **Stone sawing 6.00**

Columbus, Ohio:
- Core .30@ 1.50
- Traction .30@ 1.25
- Molding coarse 1.25@ 1.50
- Stone sawing 1.50
- Molding fine 1.75@ 2.00
- Furnace lining 2.00@ 2.50
- Sand blast 3.00@ 4.00
- Brass molding 2.00

Eau Claire, Wis.:
- Sand blast 3.00@ 3.25
- Traction .65
- Roofing sand 4.25

Elco, Ill.:
- Ground silica per ton in carloads 18.00@31.00

Elnora, N. Y.:
- Brass molding 1.75

Estill Springs and Sewanee, Tenn:
- **Molding fine and core 1.25**
- **Roofing sand, sand blast, traction 1.35@ 1.50**

Franklin, Penn.:
- Glass sand 2.25
- Core 2.00
- Molding, fine and coarse 1.75

Gray Summit and Klondike, Mo.:
- Core, roofing and brass molding 2.00
- Molding fine and coarse, traction 1.75
- Furnace lining 1.00
- Stone sawing .85@ 1.00

Joliet, Ill.:
- **No. 2 molding sand; also loam for luting purposes and open-hearth work .65@ .85**

Kasota, Minn.:
- Stone sawing 1.00

Mapleton Depot, Penn.:
- Glass sand 2.00@ 2.25
- Molding fine and traction 2.00

Massillon, Ohio:
- *Glass sand 3.00
- Core, furnace lining, molding fine and coarse 2.50
- Traction 2.25

Michigan City, Ind.:
- Core, in open car, .30; in box car .35
- Traction .25

Mineral Ridge and Ohlton, Ohio:
- Furnace lining, molding coarse, sand blast, traction (damp) 1.75
- Roofing sand (damp) 1.75@ 2.00
- Core, molding fine (damp) 2.00
- Glass sand (dry) 2.50

Montoursville, Penn.:
- Traction 1.10
- Core 1.25@ 1.50

New Lexington, Ohio:
- **Molding fine 2.00**
- **Molding coarse 1.50**

Oceanside, Calif.:
- **Roofing sand 3.50**

Ottawa, Ill.:
- Molding coarse (crude silica, not washed or dried) .75@ .85

Red Wing, Minn.:
- Core, furnace lining, stone sawing 1.50
- Molding fine and coarse, traction 1.25
- Sand blast 3.50
- Filter sand 3.75

Ridgway, Penn.:
- Glass sand 2.00
- Molding fine and coarse 1.50
- Core and furnace lining 1.75

Round Top, Md.:
- Core 1.60
- Glass sand 2.00
- Sand blast 2.25
- Roofing sand 2.25

St. Louis, Mo.:
- **Core 1.00@ 1.75**
- **Furnace lining 1.50**
- **Molding fine 1.50@ 2.50**

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y.	2.35@ 2.50	1.35@ 1.70	1.45@ 1.80	1.35@ 1.70	1.35@ 1.70	1.35@ 1.70	1.35@ 1.70
Eastern Penn and Northern Penn	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Emporium and Dubois, Penn.	1.35	1.35	1.35	1.35	1.35	1.35	1.35
Reading, Pa.	2.50	1.00		1.25			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05	1.30@1.35		1.40@1.45		1.45	1.45
Jackson, Ohio				1.30@1.35	1.00@1.05		1.30@1.35
Toledo, Ohio	1.50	1.25	1.25	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.		1.55		1.55	1.55	1.55	1.55
Ensley and Alabama City, Ala.	2.05	.80	1.25	1.15	.90	.90	.80
Longdale, Roanoke, Ruessens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.			12.00					2.20
Buffalo, N. Y.		12.00	12.00	12.00				
Lime Ridge, Penn.							5.00a	
West Stockbridge, Mass. (f)	13.00	10@11.00	5.00					2.25t
Williamsport, Penn.			10.00				6.00	
York, Penn.		10.50	10.50	11.50			8.50	1.65i
CENTRAL:								
Cold Springs, Ohio (f)		10.00	9.00		9.00	11.00	9.00	
Delaware, Ohio	12.50	10.00	9.00	10.50	9.00	15.00	9.00	1.50
Gibsonburg, Ohio (f)	12.50		9.00		9.00	11.00		
Huntington, Ind.	12.50	10.00	9.00					
Luckey, Ohio (f)	12.50							
Marblehead, Ohio		10.00	9.00				9.00	1.50c
Marion, Ohio		10.00	9.00				9.00	1.50c
Sheboygan, Wis.							9.50	
Tiffin, Ohio					9.00			
White Rock, Ohio	12.50				9.00	11.00		
Woodville, Ohio (f)	12.50	10.00	9.00		9.00	10.00	9.00	1.50
SOUTHERN:								
Allgood and Saginaw, Ala.	12.50	10.00		10.00		1.35u	8.50	1.50
El Paso, Texas							10.00	1.75
Graystone, Wilmay and Landmark, Ala.	12.50	11.00		11.00		10.00	8.50	
Karo, Va.		10.00	9.00				7.00g	1.65h
Knoxville, Tenn.	20.50	11.00				1.35	8.00	1.50
Ocala and Zuber, Fla.	13.00	12.00	10.00			1.50	12.00	1.70
Varnons, Ala. (f)		10.00p	10.00p				8.00q	1.40r
WESTERN:								
Kirtland, N. M.							15.00	
San Francisco, Calif.	20.00o	20.00o	15.00	20.00o			14.50	2.15[1]

†50-lb. paper bags, burlap 24.00; (a) run of kilns; (c) wooden, steel 1.70; (d) wood; (e) per 180-lb. barrel; (f) dealers' prices; (g) to 9.50; (h) to 1.75; (i) 200-lb. bbl., 1.65, 300-lb bbl., 2.65; (m) finishing lime, 3.00 common; (n) common lime; (o) high calcium; (p) to 11.00; (q) to 8.50; (r) to 1.50; (s) in 80-lb. burlap sacks; (t) common, 2.50 plastering; 3.00 finishing; (u) two 90-lb. bags. [1] to 2.40

*Quoted f.o.b. New York.

Miscellaneous Sands

(Continued)

- **Molding coarse 1.25@ 1.75**
- **Roofing sand 1.75**
- **Sand blast 3.50@ 4.50**
- **Stone sawing 1.25@ 2.25**
- **Traction 1.25**
- **Brass molding 2.00@ 3.00**

San Francisco, Calif:
- (Washed and dried) — Core, sand blast and brass molding 3.50@ 5.00
- Furnace lining and roofing sand 3.50@ 4.50
- Molding fine and traction 3.50
- Molding coarse 4.50
- (Direct from pit)—Core and molding fine 2.50@ 4.50

Sewanee, Tenn.:
- **Molding fine and coarse, roofing sand, sand blast, stone sawing, traction, brass molding 1.25**

Skerkston, Ont.:
- **Traction (lake sand) .65**

Tamalco, Ill.:
- **Molding coarse 1.25@ 1.50**

Tamms, Ill.:
- **Ground silica per ton in carloads 20.00@31.00**

Thayers, Penn.:
- **Core 2.00**
- **Molding fine and coarse 1.25**
- **Traction 2.25**

Utica, Ill.:
- Core, furnace lining, brass molding (crude) .60@ 1.15
- Molding fine and coarse (crude) .55@ 1.15
- Traction 1.00
- Roofing sand 1.00@ 2.75
- Stone sawing 1.00@ 2.85
- Sand blast 2.85@ 3.50
- Core .65
- Molding fine .60
- Furnace lining and molding coarse .70

Utica, Penn.:
- Core 2.00
- Molding fine and coarse 1.75

Warwick, Ohio.:
- Core, molding fine and coarse (green) 1.75
- Core, molding fine (dry) 2.25

Zanesville, Ohio:
- Glass sand 2.50
- Furnace lining 2.00
- Molding fine and brass molding 1.50@ 1.75
- Molding coarse 1.50
- Core and traction 2.50

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:
- **Crude talc (mine run) 3.00@ 4.00**
- **Ground talc (20-50 mesh), bags 10.00**
- **Cubes 55.00**
- **Blanks (per lb.) .08**
- **Pencils and steel workers' crayons, per gross 1.25**

Chatsworth, Ga.:
- Crude talc 4.50
- Ground talc (20-50 mesh) bags 7.00@ 8.00
- Ground talc (150-200 mesh) bags 8.00@15.00

Chester, Vt.:
- **Ground (150-200 mesh), bags 9.00@15.00**
- **Bags 10.00@11.00**

Chicago and Joliet, Ill.:
- **Ground (150-200 mesh), bags 30.00**

Dalton, Ga.:
- Crude talc 5.00
- Ground talc (150-200) bags 10.00
- Pencils and steel workers' crayons, per gross 1.00@ 2.50

Emeryville, N. Y.:
- **(Double air floated) including bags; 325 mesh 14.75**
- **200 mesh 13.75**

Hailesboro, N. Y.:
- Ground white talc (double and triple air floated) including bags, 350 mesh 15.50@20.00

Henry, Va.:
- **Crude (mine run) 3.50@ 4.00**
- **Ground (150-200 mesh), bags 9.00@15.00**

Joliet Ill.:
- Ground talc (150-200) bags 30.00

Keeler, Calif.:
- **Ground (200-300 mesh), bags 20.00@30.00**

Natural Bridge, N. Y.:
- **Ground talc (300-325 mesh), bags 13.00**

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

- Gordonsburg, Tenn.—B.P.L. 68-70% 4.50@ 5.00
- Mt. Pleasant, Tenn.—B.P.L. 72% 5.50@6.00
- **B.P.L. 75% 6.00@ 6.50**
- **B.P.L. 75% (free of fines for furnace use) 6.50@ 6.75**
- **Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L. 5.50**
- **Twomey, Tenn.—B.P.L. 65%, 2000 lb. 7.00@ 8.00**

(Continued on next page)

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City or shipping point	8x8x16	8x10x16	8x12x16
Columbus, Ohio	.17@.19†		.27@.29†
Forest Park, Ill.*	18.00	23.00	30.00
Indianapolis, Ind.	.12@.14†	....	....

*Price per 100 at plant. †Face.

Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted.

	10"x24"	12"x24"	15"x24"	18"x24"	24"x24"	30"x24"
Indianapolis, Ind.	.80	.90	1.10	1.30	1.70	2.70

Cement Tile

Prices are net per sq. in carload lots, f.o.b. nearest shipping point unless otherwise stated.

Cicero, Ill.	Hawthorne tile, per sq.
Red Spanish	10.00
Green Spanish	12.00
Red French	9.50
Green French	11.50

	—Cicero— Red	Green
Ridges	.25	.35
Hips	.20	.30
Ridge closers	.05	.06
Hip terminals, 3 way	1.25	1.50
Hip starters	.50	.60
Gable finials	1.25	1.50
Gable starters	.20	.30
End bands	.20	.30
Eave closers	.06	.08

Indianapolis, Ind.	
Gray	10.00
Red	12.00
Green	15.00

(Continued from preceding page)

Ground Rock
(2000 lb.)

Gordonsburg, Tenn.—B.P.L. 68-72%	4.00@ 5.00
Mt. Pleasant, Tenn.—B.P.L. 65%	6.50
13% phosphorus, 95% thru 80 mesh	5.75
Twomey, Tenn.—B.P.L., 65%	7.00@ 8.00

Florida Phosphate
(Raw Land Pebble)
Per Ton

Florida—F. O. B. mines, gross ton,

68/66% B.P.L., Basis 68%	2.50
70% min, B.P.L., Basis 70%	2.75
72% min. B.P.L., Basis 72%	3.00
75/74% B.P.L., Basis 75%	4.00

Fluorspar

Fluorspar, 85% and over calcium fluoride, not over 5% silica, per net ton, f.o.b. Illinois and Kentucky mines	16.00
No. 2 lump, per net ton	19.00
Fluorspar, foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Philadelphia, duty paid, per net ton	15.00@16.00
Fluorspar, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, per net ton, f.o.b. Illinois and Kentucky mines	32.50

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Barton, Wis., f.o.b. cars	....	10.50
Brandon, Vt. — English pink and English cream	*11.00	*11.00
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries	....	17.50
Crown Point, N. Y. — Mica Spar	....	(a)10.00@12.00
(a) Includes bags.		
Easton, Penn., and Phillipsburg, N. J.— Green granite	12.00@16.00	16.00@20.00
Haddam, Conn. — Felstone buff	15.00	15.00
Harrisonburg, Va.—Blk marble (crushed, in bags	†12.50	†12.50
Ingomar, Ohio	....	10.00@20.00
Middlebrook, Mo.—Red	....	20.00@25.00
Middlebury, Vt. — Middlebury white	‡9.00	‡9.00
Milwaukee, Wis.	....	14.00@34.00
Newark, N. J.—Roofing granules	....	7.50
New York, N. Y.—Red and yellow Verona	....	32.00
Red Granite, Wis.	....	7.50
Sioux Falls, S. D.	7.50	7.50
Stockton, Cal. — "Natrock" roofing grits	....	12.00
Tuckahoe, N. Y.	....	12.00
Villa Grove, Colo.	....	13.00
Wauwatosa, Wis.	....	16.00@45.00
Wellsville, Colo.—Colorado Travertine Stone	15.00	15.00

†C.L. Less than C. L., 15.50.
*C.L. including bags; L.C.L. 14.50.
‡C.L. including bags; L.C.L. 10.00.

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	26.00@32.00
Baltimore, Md. (Del. according to quantity)	16.00@16.50	22.00@50.00
Ensley, Ala. ("Slag-tex")	12.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Friesland, Wis.	22.00	32.00
Milwaukee, Wis.	15.00@16.00	30.00@42.00
Omaha, Neb.	18.00	30.00@40.00
Philadelphia, Penn.	†15.25	‡21.50
Portland, Ore.	17.00	23.00@58.00
Prairie du Chien, Wis.	14.00	25.00@32.00
Rapid City, S. D.	18.00	25.00@45.00
Watertown, N. Y.	20.00	35.00
Wauwatosa, Wis.	14.00	20.00@42.00
Winnipeg, Man.	14.00	22.00

†Gray. ‡Red.

Sand-Lime Brick

Prices given per 1000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass.	14.00@15.50
Brighton, N. Y.	16.75
Dayton, Ohio	12.50@13.50
Detroit, Mich.	14.00@15.00
Farmington, Conn.	14.00
Grand Rapids, Mich.	12.00
Hartford, Conn.	14.00
Jackson, Mich.	13.00
Lancaster, N. Y.	13.00
Michigan City, Ind.	12.00
Milwaukee, Wis.	13.00
Portage, Wis.	15.00
Rochester, N. Y. (del. on job)	19.75
Saginaw, Mich.	13.00
San Antonio, Texas	13.00@13.50
Syracuse, N. Y.	16.00@18.00
Terra Cotta, D. C.	13.50
Wilkinson, Fla.—White	12.00
Buff	16.00

Gray Klinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrated, per ton Finishing	Common
Atlanta, Ga.	22.50	14.00
Baltimore, Md.	24.25	17.85
Boston, Mass.	20.00	13.50@15.00
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	18.00
Dallas, Tex.	20.00	——
Denver, Colo.	24.00	....
Detroit, Mich.	12.40	12.40
Kansas City, Mo.	19.50	18.50
Los Angeles, Calif.	....	18.00
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.	....	21.00
New Orleans, La.	24.00	16.00
New York, N. Y.	18.20	12.00@13.10
Philadelphia, Penn.	23.00	16.00
St. Louis, Mo.	23.00	19.00
San Francisco, Calif.	....	22.00
Seattle, Wash. (paper sacks)	24.00	——

Portland Cement

Prices per bag and per bbl. without bags net in carload lots.

	Per Bag	Per Bbl
Baltimore, Md. (10c discount)	....	2.75*
Boston, Mass.	....	2.63
Buffalo, N. Y.	....	2.48
Cedar Rapids, Iowa	....	2.44
Cheyenne, Wyo.	.86½	3.46
Cincinnati, Ohio	....	2.47
Cleveland, Ohio	....	2.39
Chicago, Ill.	....	2.20
Columbus, Ohio	....	2.44
Dallas, Texas	.48¾	1.95
Davenport, Iowa	....	2.39
Dayton, Ohio	....	2.48
Denver, Colo.	.66¼	2.65
Detroit, Mich.	....	2.25
Duluth, Minn.	....	2.19
Indianapolis, Ind.	....	2.39
Kansas City, Mo.	....	2.47
Los Angeles, Calif.	.63	2.52
Louisville, Ky.	....	2.45
Memphis, Tenn.	.65	2.60
Milwaukee, Wis.	....	2.25
Minneapolis, Minn.	....	2.42
Montreal, Que.	....	1.90
New York, N. Y.	....	2.25
Norfolk, Va. (10c discount)	....	2.75*
Omaha, Neb.	....	2.86
Philadelphia, Penn.	....	2.41
Pittsburgh, Penn.	....	2.19
Richmond, Va. (10c discount)	....	2.87*
San Francisco, Calif.	....	2.71*
St. Louis, Mo.	....	2.30
St. Paul, Minn.	....	2.42
Seattle, Wash. (10c discount)	....	2.65
Toledo, Ohio	....	2.40
Winston-Salem, N. C. (10c discount)	....	3.19*

NOTE—Add 40c per bbl. for bags.

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Buffington, Ind.	....	1.95
Concrete, Wash.	....	2.35
Davenport, Calif.	....	2.05
Hannibal, Mo.	....	2.05
Hudson, N. Y.	....	2.45*
Leeds, Ala.	....	1.95
Mildred, Kan.	....	2.35
Nazareth, Penn.	....	1.95
Northampton, Penn.	....	1.95
Steelton, Minn.	....	2.00
Universal, Penn.	....	1.95

*Including sacks at 10c each.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ¼x32x 36". Wt. 1500 lb. Per M Sq. Ft.	⅜x32x 36". Wt. 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lgths. 6'-10', 1850 lb. Per M Sq. Ft.
Centerville, Iowa	3.00	12.00	12.00	9.00	10.00	10.50	11.00	....	25.80	11.00	....	....	....
Douglas, Ariz.	....	....	7.00	....	....	15.50d	18.50	....	30.00	15.50	....	....	....
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50	....	26.55	20.00	....	....	....
Gypsum, Ohio‡	3.00	4.00	6.00	8.00	9.00	9.00	19.00	7.00	27.00	19.00	20.00	20.00	30.00
Hanover, Mont.	....	....	....	11.80	....	....	....	....	....	....	....	....	....
Los Angeles, Calif.	....	....	....	8.00b@10.40c	....	....	....	....	....	....	....	....	....
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	....	20.00	30.00
Portland, Colo.	....	....	....	10.00	....	....	....	....	....	....	....	....	....
San Francisco, Calif.	....	....	....	....	16.40	....	17.40	....	....	....	....	....	....
Sigurd, Utah	....	....	....	....	....	....	....	....	18.00a	....	....	....	....
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	....	....	....	....	22.00	....	34.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
*To 3.00; †to 11.00; ‖to 12.00; ‡prices per net ton, sacks extra; (a) to 21.00; (b) net; (c) gross.
(d) Hair fibre.

News of All the Industry

Incorporations

Ideal Sand and Gravel Co., Mt. Healthy, Ohio, $10,000. Chas. Scull.

Whitecliffs Corp., New York, N. Y., $3,000,000, cement. (U. S. Corp. Co.)

West Fullen Granite Co., Oklahoma City, Okla., $10,000. Texas agent, C. L. West, Dallas.

Continuous Plaster Ground Co., Portland, Ore., $5,000. Walter H. Wetzler and R. B. Rauch.

Iron City Sand and Gravel Co., Cumberland, Md., $50,000. Geo. Vang and Jas. C. Schriver.

Riverside Sand and Gravel Co., Norfolk, Va., $50,000. W. L. Bentley, Jr., 1304 Debree Ave.

Standard Soapstone Co., Arlington, Va., has changed its name from that of Phoenix Stone Co.

Columbia Marble Co., Knoxville, Tenn., $100,-000. B. C. Gibbs, 116 Churchwell Ave., and others.

Henry Sand and Gravel Co., Seattle, Wash., $100,000. C. P. Bissett, Jr., J. E. Peterson and Robt. B. Porterfield.

Standard Building Tile Co., Baton Rouge, La., $30,000. Andrew Clausen and Wm. F. Green. Manufacture concrete tile, etc.

Anthony Mastracchio, 2308 Cretona Ave., N. Y., reported to establish plant to manufacture cement products at Tampa, Florida.

Spickler Crusher Rock Co., Topeka, Kas., $75,-000. Mr. and Mrs. John C. Spickler, F. P. and L. W. Elmore, O. F. Baker, all of Topeka.

Bills Creek Gravel Co., Bluffton, Ind., 50 acres gravel land acquired. Frank C. Waugh, Forrest Woodward and John Eversole, all of Bluffton.

Cumberland Quarries, Inc., Coalmont, Tenn., $1,000. John E. Patton, John E. Patton, Jr., J. I. Sweeten, D. W. Sartain and F. R. Harris.

Arkansas Cement Corp., New York, N. Y., $6,000,000. Robert K. Thistle, M. A. Castoldie, Geo. V. Reilly, all of New York. (U. S. Corp. Co.)

Concrete Slab Mfg. Co., St. Louis, Mo., $25,-000. Office: 8926 West Florisant Ave., A. B. Dowell and Pete Catanzaro, both of Jennings, Mo.

Sierra Lime & Mineral Co., Sacramento, Calif., $25,000. Directors: Allen F. Grant, M. K. Grant, J. F. Dunasky, Chas. J. Eastman and S. Hornstein.

Adamant Portland Cement Corp., Iowa, $4,000,-000. T. T. Blaise, Mason City, Iowa; C. J. Lambert, H. S. Boyes, Sigourney, Iowa. (American Charter Co.)

Louis Perna & Sons, Inc., Washington, D. C., $10,000, stone quarries. Louis, Joseph and Frank Perna and W. Ameroso, all of Washington, D. C. (Corporation Service Co.)

Westside Cement Construction Co., 152 Market St., Paterson, N. J., $100,000. S. Gubitosa, 295 East Eighteenth St., Louis Antonucci, Little Falls, N. J., Jeanette M. Petrie. Reuben H. Reiffin, attorney.

New Minden Lime Stone Co., New Minden, Ill., $25,000. Mining, manufacturing and marketing of limestone and its manufactured products. August Vogt, and Wm. Sachtleben. Correspondent: J. P. Carter, Nashville, Ill.

Sand and Gravel

Commercial Lime Co., Ocala, Fla., is having a new crushing plant built at Reddick, Fla.

T. A. Thompson, Brandford, Fla., is constructing a crushing plant at Williston, Fla.

Acme Gravel Co. has opened an office at 1401 Potrero Ave., San Francisco, Calif.

Cornell and Schultz, Inverness, Fla., are building a crushing plant at Williston, Fla.

Lincoln Sand and Gravel Co., Lincoln, Ill., has completed the stripping of a new sector at their quarry.

Kansas City-Bonner Springs Sand Co., Bonner Springs, Kans., is expected to open a plant in the Kaw River soon.

Medford Washed Sand and Gravel Co., Owatonna, Wis., has added a second shift to the plant to care for increased business.

Union Rock Co., Los Angeles, Calif., intends to move its garage facilities to Baldwin Park, Calif., within a short time.

Rockton Molding Sand Co., Rockton, Ill., has added several new grades of sand to its production and opened a new pit at Sandusky, Ohio.

Illinois Slag and Ballast Co., Chicago, Ill., has awarded contract for erection of one-story plant, 48x95 to cost $50,000 to E. G. Seip, Chicago, Ill.

Brownwood Rock Crusher Co., Brownwood, Texas, since start of operation in July, 1924, has been producing an average of 1500 tons per day of crushed rock.

Capt. Jos. Bell and **C. D. Stromler**, Marine City, Mich., operating an independent sand and gravel business on the St. Clair river, lost their dredge Penobscot by fire recently.

P. W. B. Navigation Co., Ltd., Vancouver, B. C., had a scow laden with 200 cu. yds. of gravel and sand sunk at the dock of the Port Angeles Sand and Gravel Co., Port Angeles, Wash.

M. H. Pengra and **Frank Tubandt** have purchased 8½ acres of land near Milwaukie, Ore., and are erecting a gravel plant of 250 yd. per day capacity. Operation is expected to begin within a short time.

Red Wing, Minn., municipal sand and gravel plant has sold to the Grant-Smith Construction Co. (holders of contract for paving Red Wing-Lake City highway) 6000 yds. of gravel at $1.75 per cu. yd. and 3,000 yd. of sand at 60 cents per yd.

Moline Consumers Co., Moline, Ill., has petitioned the council of Quincy, Ill., for the right to lay tracks across a plot of city land in order to reach the C. B. & Q. R. R. switch tracks, and to establish a harbor in that city so as to facilitate the marketing of sand and gravel from a nearby pit on which the company has a long lease.

Bound Brook Crushed Stone Co., Newark, N. J., has been the subject of a complaint by citizens of Martinsville and Somerville, N. J., who allege property damage through blasting at the company quarries near these towns. Property owners recently met with company representatives and it is expected matters will be adjusted satisfactorily in a short time.

Magna Sand Corporation, Philadelphia, Penn., has had a bill of receivership filed against it by Louis M. Golden, plant manager, in behalf of himself and other creditors. Insolvency due to mismanagement is alleged although there is on hand sufficient product to pay all creditors. An order of restraint of operation has been issued by the court and a hearing set for an early date.

Reed-Powers Stone Co., Bedford, Ind., is the defendant in a suit brought by the Bloomington Southern R. R. Co. in which the plaintiff seeks to restrain the stone company from the quarrying of rock at their quarry in Monroe county. It is alleged that the company has trespassed on the railroad right of way and if not restrained will permanently injure it so that the grade will be impossible to be rebuilt. A temporary order of restraint has been issued by Judge J. W. Williams of the Morgan Circuit Court and September 15 set as the date for hearing.

Gypsum

James G. Houghton, building inspector of Minneapolis, Minn., has approved gypsum sheathing as a substitute for lumber and building paper, following a test of the material made recently.

Beaver Products Co., Buffalo, N. Y., met with the loss of a stock of material through fire in a steel storage building at their Akron, N. Y., plant. In the last issue, this fire was referred to as having occurred at the Plasterboard Co., but through the kindness of Mr. Charles Spengler, superintendent of the Beaver Products Co. plant at Akron, the above item is the correct version.

Standard Gypsum Co., Long Beach, Calif., has received permission from the Long Beach Harbor Commission to construct docks outside the pier limits of the harbor. A few weeks ago the building commissioners held up this construction because the commission had denied the company's request. Their recent action is based on the recommendation of the city attorney who stated that a private concern or individual had the right to improve its harbor facilities, so long as such improvements were not detrimental to shipping. This port ruling is said to be international in scope.

Agricultural Limestone

Ocala Lime Rock Co., Ocala, Fla., C. E. Ireland, president, has increased its capital stock from $100,000 to $250,000, and will double its output. Opening new quarry.

Farm bureaus throughout the country report great increases in use of limestone among farmers. Harvey Sconce, Sidell, Ill., was a purchaser recently of 1000 tons of limestone for his scientifically conducted 320 acre farm. A short time ago, from 80 acres of soil treated with limestone, Mr. Sconce had a yield of 3200 bu. of wheat which brought a premium of 5 cents a bushel.

Lime

Saginaw Lime and Stone Co., Longview, Ala., are opening a new limestone quarry near their plant at Saginaw. Daily production is now about 800 bbl. of lime and is expected to be increased shortly.

Quarries

Russell Stone Quarry Co., Tenino, N. Y., have reopened their quarry for a long run.

Brodie Stone Quarries, Lyons, Colo., have reopened their plant after a long shutdown.

E. J. McMahon has been appointed executive secretary of the newly formed St. Louis Quarrymen's Association and for the time being will maintain offices in that city. The Association was formed by 15 leading quarry companies of St. Louis to promote the greater use of limestone products in the district.

Cement

Michigan State Prison, Chelsea, Mich., cement plant, has been damaged by fire to extent of about $35,000.

Newaygo Portland Cement Co., Newaygo, Mich., is to remodel its baseball grounds and erect a new grandstand.

Calaveras Cement Co. has opened a sales office at 315 Montgomery St., San Francisco, Calif., with Philip Kraft in charge.

North American Cement Corp., N. Y., (recently formed by merger of Security Lime and Cement-Helderberg Cement Co.) has changed its name to the American Cement Corporation of New York.

Roche Harbor Lime and Cement Co., Seattle, Wash., entertained 80 business and professional men from the Northwest and California at the annual harvest festival held at Roche Harbor, Wash. Festivities were concluded with an inspection of the company plant at Roche Harbor.

Monolith Portland Cement Co., Monolith, Kern county, Calif., is planning the abandonment of its present fuel system, which consumes vast quantities of oil, and install a natural gas fuel plant, obtaining the gas from a tap line with one of the main pipe lines leading from Elk Hills to Los Angeles. The cost of the change is estimated to be about $350,000.

Cement Products

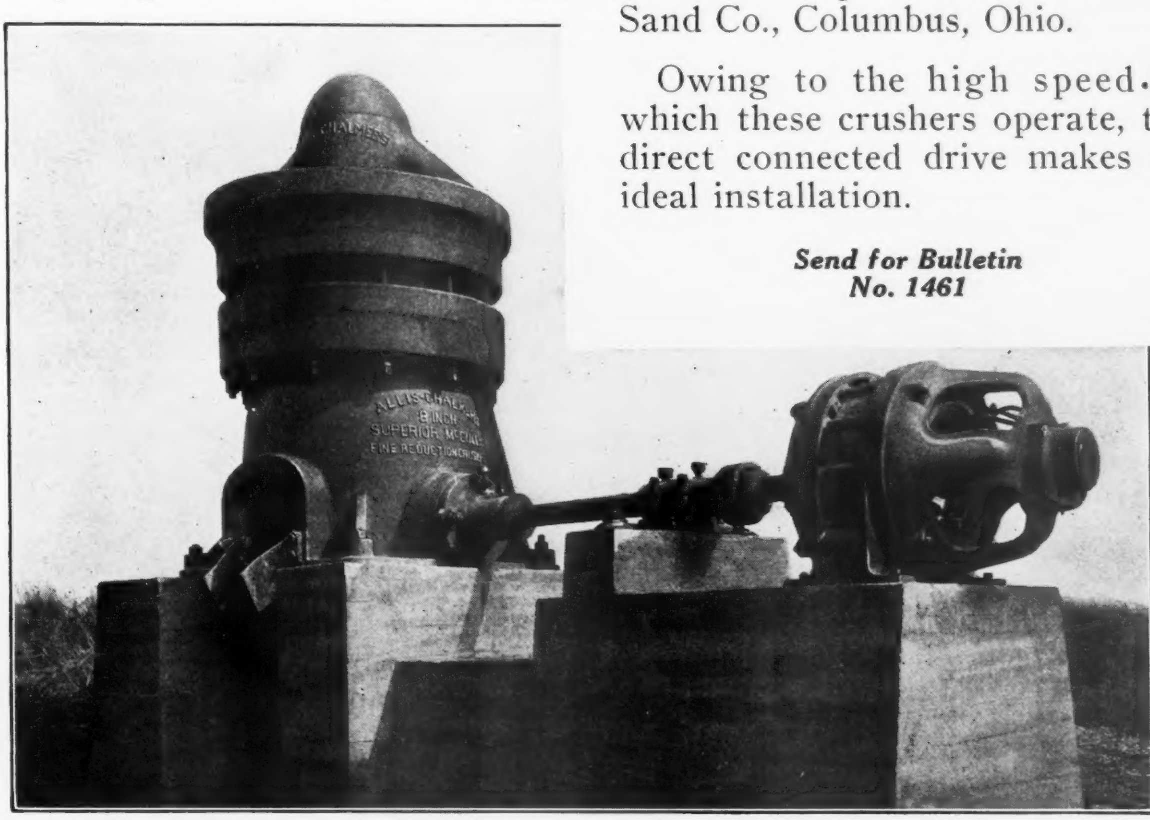
Earl L. Bastain, 3 S. Charleston St., and Chas. J. Schmidt, are establishing a plant in Charleston, W. Va., for the manufacture of outdoor furniture of concrete, and will specialize in sun dials, pedestals, benches, etc.

Glur Cement Products Co., Columbus, Neb., has added a new cement and gravel pit at its cement block factory. Plans are made for extensive additions in building and equipment so as to double the capacity of the plant.

Superior McCully Fine Reduction Gyratory Crusher

The most successful secondary gyratory crusher on the market today

Allis-Chalmers 6-inch Superior McCully Fine Reduction Gyratory Crusher direct connected to an Allis-Chalmers 50 H. P. type ANY slip ring motor at 600 R.P.M., installed in the plant of the Hallock Sand Co., Columbus, Ohio.



Owing to the high speed at which these crushers operate, the direct connected drive makes an ideal installation.

Send for Bulletin No. 1461

Sizes, Capacities, Horse Power, and Weights:

Size of Crusher in Inches	Two Feed Openings Size Each in Inches	CAPACITY PER HOUR IN TONS OF 2000 POUNDS — Size of Discharge Opening in Inches									DRIVING PULLEY		H.P. Required	Weight of Crusher in Lbs.
		¾	⅞	1	1¼	1½	1¾	2	2¼	2½	Size in Inches	R.P.M.		
6	6x40	24	28	32	40	48	....	....	....	....	36x12½	500	40 50	32000
10	10x52	....	....	....	....	80	94	107	120	135	36x18½	450	75 100	64000

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

Gold Dust from Our Waste Flume

Irrelevant and Amusing Stuff That Passes Our Editorial Desks

Introduction—and Apology

ROCK PRODUCTS is a pretty darn serious paper, and editing it is a serious job, at least we take ourselves rather seriously. Every day great bunches of serious looking mail comes to our desks, government reports galore—very formal analyses of the state of country—important-looking diagnoses of industries by bankers of renown, etc., etc. We get to wondering how old Uncle Sam manages to get along with so much diagnosing and advising—and then we add our own weighty contributions.

But along with all this important mail comes various house organs, newspaper clippings and miscellaneous trash which gives us many a smile and laugh and takes out some of the wrinkles in our editorial brows. We have been throwing these away, after enjoying them ourselves—but that seems selfish, so from now on we are going to share them with you, not regularly, but once in a while when we have an accumulation.

We are going to stick this page way back in the book, because we're rather ashamed to run it in such a dignified sheet. We'll compare it, for the present at least, with the practice of a few California aggregate producers who put riffles in their waste flumes to recover the small particles of gold that are there, even though you can't see them.

If there are too many chestnuts and ripe ones of other varieties, just give us h—l.—The Editors.

Told by S. McPherson

S. McPHERSON is general secretary of the Institution of Quarry Managers (Great Britain). Maybe he is Scotch. Anyhow he told this story at the recent convention of the Institute:

In Scotland a quarry manager last winter made up his mind to send a little bit of appreciation to his customers at Christmas. He thought a very fitting present would be a turkey, and about a fortnight before the time sent a letter to each customer stating that, with his kind permission, he would send a turkey for Christmas. Some replied thanking him for his kindness; others waited to see what sort of a bird was sent; but one gentleman wrote: "Dear Sir—I do not want your turkey.—Signed, John McTavish."

The quarry manager was much perturbed, as Mr. McTavish was a very good customer, so he went down to see him when the following conversation took place:

Q. M.: "Good morning, Mr. McTavish, I've come down about the letter you sent me."

McT.: "What letter?"

Q. M.: "Saying you did not want the turkey I was going to send you."

McT.: "Well, I don't want your turkey. I want no bribes."

Q. M.: "But, Mr. McTavish, this is not a bribe. It's only a small appreciation of your kindness to us."

McT.: "Well, I want no appreciation. Sell the turkey if you want to get rid of it."

Q. M.: "Now, that's a good idea. Will you buy it, Mr. McTavish?"

McT.: "Hum! How much do you want for it?"

Q. M.: "Well, let's see. Say sixpence."

McT. (suspiciously): "Saxpence for a turkey? Is it a good turkey?"

McT.: "A lovely turkey, sir; about 25 lb."

McT.: "I can have it for 6d?"

Q. M.: "Yes."

McT.: "Well, here is a shilling. Send me two."

Have you heard this story? A Scotsman went to the gates of heaven where Peter came to ask his name. "My name's McPherson," he said. "You come from Scotland?" "Aye." "Just wait a minute while I see if your name is in the books." Peter went to look, and when he returned McPherson was gone—and so were the golden gates.—*Quarry Managers' Journal.*

"TO THE FLAPPERS"

Blessings on thee, little dame,
Bareback girl with knees the same.
With thy rolled-down silken hose
And thy short, transparent clothes;
With thy red lips reddened more,
Smeared with lipstick from the store;
With thy make-up on thy face,
And thy bobbed hair's jaunty grace,
From my heart I give thee joy,
Glad that I was born a boy.

—*Kreolite News.*

"If you refuse me," he swore, "I shall die."

She refused him.

Sixty years later he died.

—*R. & R. Lime Bulletin.*

"Common Sand"

By Frederick Moxon
Rockville, Conn.

ROCK PRODUCTS does not deal in poetry, but the following may have value as advertising to plants which furnish sand for sand piles. This is a business which amounts to a considerable tonnage in many towns and cities:

You see no poetry in sand, you say?
Come here—just watch those happy kids at play
Where somebody has dumped a load of sand—
And afterwards you'll better understand.
A broken cup, an old tin can or two,
Are all the tools they need with which to do
A job of building on a scale as large
As any big contractor has in charge.
They'll build a castle, a garage, a store,
A school and church and houses by the score,
And one amibtious architect of eight
Will build a fire station while you wait.

You see no poetry in sand? Look there—
Just watch upon the beach that sun-browned pair
With bits of driftwood scoop, and scrape and dig,
Happy as children in their bathing rig:
And presently he draws a double heart
With his and her initials, and a dart,
And somehow, underneath a pile of sand,
They each discover a responsive hand!

No poetry in sand? Then you have missed
The Magic Brand, not on the dealer's list.

COSMOPOLITAN

Customer—Do you serve lobsters here?

Waiter—Sure. We serve anybody; sit down.—*Marion Excavator.*

Farmer: "Have all the cows been milked?"

Dairymaid: "All but the American one."

Farmer: "Which do you call the American one?"

Dairymaid: "The one that's gone dry."—*Hercules Record.*

Applebaum & Goldblatt received this telegram from a western hotel: "Your salesman, Sam Goldstein, died here today. What shall we do?" The hotel manager received the following reply: "Search his pockets for orders."—*Bertha-Consumers Coal Bulletin.*